PACKAGE engineering

Task force spearheads packaging switch

New floor layout, special equipment, better work methods, and standard-quantity packaging result from pooling of talent by team of experts to develop a new packaging operation out of an old one. (See page 25)

How do you teach package engineering?

One major company does it on-the-job by holding classes geared to job needs and by giving class-trained engineers job assignments that let them use what they've learned. (See page 29)

Preventing bottle breakage in cases

Finding the best way and place to put cushioning materials within a case of bottles led to a thorough review of current methods and close study of container component and cushioning material tests. (See page 34)

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OCTOBER 1958

VOLUME 3 • NUMBER 10

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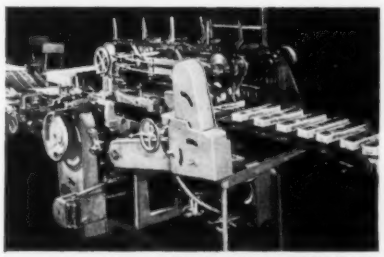

Package Machinery Model FA

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OCTOBER 1958 • VOLUME 3 • NUMBER 10

PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

For your calendar

September 30, Oct. 1-2. Fourth Joint Military-Industry Packaging and Materials Handling Symposium, sponsored by the Department of the Navy in cooperation with other military departments and the Department of Commerce, in Washington, D.C. Contact: Head, Packaging Section, Supply Programs Division, Office of Naval Material, Washington 25, D.C. *Telephone: Liberty 5-6700, Ext. 61061.*

October 13-15. Packaging Institute, 20th Annual Forum, Edgewater Beach Hotel, Chicago, Illinois. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, New York. *Telephone: Murray Hill 7-8875.*

October 14-16. Society of Industrial Packaging and Materials Handling Engineers, 13th National Industrial Packaging and Handling Exposition, and SIPMHE short course, Chicago Coliseum, Chicago, Illinois. Contact: C. J. Carney, managing director, Society of Industrial Packaging and Materials Handling Engineers, Suite 1534, 14 E. Jackson Blvd., Chicago 4, Illinois. *Telephone: Harrison 7-6123.*

October 27-29. AMA Clinic on Packaging For Truck Fleet Operations, Hotel Astor, New York City. Contact: Franc M. Ricciardi, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

February 20-23. 52nd Annual Exhibit of the Canning Machinery and Supplies Association, Conrad Hilton Hotel, Chicago. Contact: Mr. W. D. Lewis, Secretary-Treasurer, Canning Machinery & Supplies Association, 4630 Montgomery Avenue, Washington 14, D.C. *Telephone: Oliver 6-6979.*

February 21-24. 52nd Annual Convention of the National Canners Association, Conrad Hilton Hotel, Chicago. Contact: Mr. Nelson H. Budd, National Canners Association, 1133 20th Street, N.W., Washington 6, D.C. *Telephone: Executive 3-7030.*

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25 Packaging group pays off: New operation succeeds
How Crane Co. got a new floor layout, special equipment, better work methods and flow—all resulting in a new packaging operation geared to turn out standard-quantity packaging faster than before.

29 How we teach package engineering on-the-job, by Kenneth R. Marvin, technical advisor, industrial engineering division, Eastman Kodak Company
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34 How to locate optimum placement of cushioning for liquids in glass containers, by Allyn C. Beardsell, president, and Jerome J. Kipnees, assistant to the president, Container Laboratories, Inc.
First part of a three-part article taking a close look at the problems of placing cushioning within a case to prevent bottle breakage—stressing tests and their application and interpretation.

48 Cooling tunnel makes year-around paste-wax packaging practical, by Joseph Petrancosta, superintendent, Turtle Wax-Plastone Company
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54 Testing of molded styrene for packaging applications, by Bennett Nathanson, technical service manager, plastics division, Monsanto Chemical Company
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60 Packaging Institute announces annual forum
Reviewing all details of "Packaging . . . food for thought," Packaging Institute's 20th annual national packaging forum to be held in Chicago October 13-15.

64 SIPMHE announces packaging, handling and shipping show, short course
Enumerating the features of the Society of Industrial Packaging and Materials Handling Engineers' packaging, handling and shipping show and short course to be held in Chicago October 13-16.

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Reader Service Card inside back cover

Our December 1958 issue will carry a cumulative editorial index for the year listing our feature articles by subject, author, and other headings.

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A note from the Publisher

Allocating packaging costs

An opportunity exists today to revise package costing methods—an opportunity that we hope will not come again for, in any recession of business, orders come from top management to reduce costs drastically. Now is the time to compel the allocation of package costs to the proper department. You won't save money for the company as a whole by proper cost allocation, but you can relieve erroneous top management pressures by showing where the money is actually spent.

Frequently the pressure for cost reduction is based solely on an examination of the cost figures by executives who may be skilled in management, but who may also be unaware of the detail by which the package cost figures are built up. Now is the time to force these obscure matters into the open.

For years there have been periodic hassles between sales and production as to where to charge certain package costs such as multicolor printing on cartons, wrappers, and labels; expensive coated, high-gloss carton board, and papers; convenience items like tear tapes, easy opening cases, or the printing of sales messages on all four sides of the shipping containers, etc. Not one of these items—(no matter how important to the company they may be) is an expense properly chargeable to production. Every one of them is for the benefit of improving the selling ability of the package, and that's all to the good—but it's not production.

Nobody in his right mind would want to reduce the selling effort of the company nor the effectiveness of the package itself in self-selling. But many a production manager has been harrassed into reducing his packaging costs, while at the same time the sales department is adding costs by asking for added art work, multicolor printing, extra wrappers, bands, inserts, outserts, and the like. All of these cost extra money for service and materials and are worth it if they sell more goods. Often they add extra production expense in turning out the improved package. Sometimes the added expense is caused by a sales department's insistence on the use of a barrier material in a certain way that incurs a higher expense than if it were used in a different way, or in the way necessary for a good functional package. Fine—if it sells the goods—but it is not properly a production cost.

Most packages have the dual function of protecting the product and helping sell the product, but I cannot see the logic in cost accounting methods that charge all package costs to production, regardless of function.

It may not be easy to persuade the company to modify its cost allocations and use a little common sense, but if it is ever to be done, now is the time to do it.

Angus J. Ray

Publisher

PACKAGE engineering®

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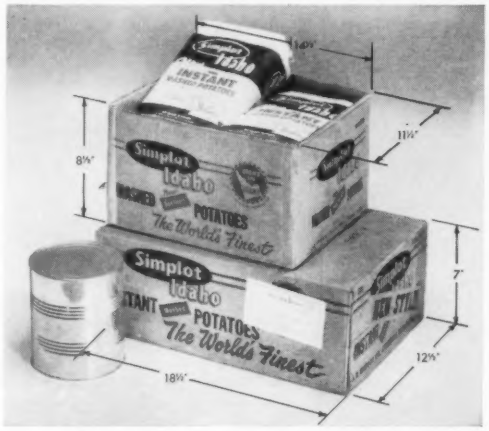
BPA

Packaging is more than "Skin Deep"!

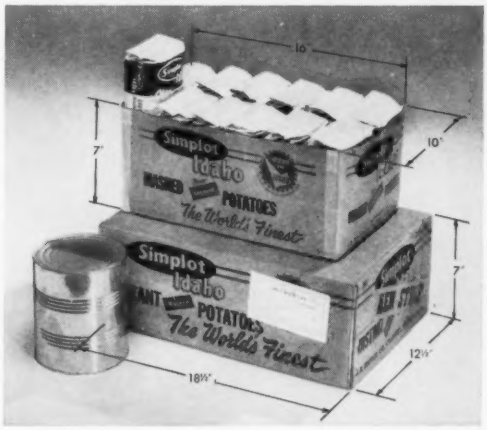
PACKAGING PROBLEM

The Simplot Company was packaging their Instant Mashed Potato granules in #10 tin cans. They were concerned with the package because some small restaurants were unable to use a complete can at one time (each can contained enough product for 150 servings). The cans were expensive, and their weight made shipping charges high.

Simplot working with Western-Waxide's Research and Development Laboratory went in search of a package that would provide the needed protection, convenience, and economy.



10# bags save 201 cu. in., carry 40 lbs. per case!



3# bags save 498 cu. in. per 36 lbs. product!

SOLUTION:

Western-Waxide's Research and Development Laboratory had previously developed a bag for a dried milk producer. Called the Crown Dri-Pak* bag, its construction is bleached kraft paper laminated to .00035" foil with polyethylene coating over the foil. Bag closure is achieved by heat sealing with standard equipment. It is strong, an excellent water-vapor barrier, very economical, and can be produced in a variety of sizes. It is also easy to reclose for temporary protection of unused portions.

Crown Dri-Pak bags filled with Simplot instant potato granules were placed in the "tropics room" of the San Leandro Laboratory, R. H. 90% and temperature 100°. Ninety days later, the sample showed *only ½% moisture gain*—and no trace of discoloration or flavor damage. These tests clearly indicated that the Crown Dri-Pak bag was the answer to this packaging problem.

Two bag sizes were adopted—3# and 10#—to provide maximum convenience to customers. Most small restaurants use the contents of the 3# bag (75 servings) at one time. If there are leftovers, the dead-folding properties of the foil allow the bag to be folded over snugly for further protection. Larger institutions find the 10# bag suits their daily needs.

The new package is economical: 3# bags, packed twelve to a shipping case, result in combined packaging and shipping savings of $17.80 per ton of product. The larger 10# bags, packed four to a case, reflect a savings of $28.70 per ton of product. In addition, the bag is easy to open, handle, and reclose; less storage space is required (see photos above) and empty bags are more easily disposed of than tin cans. And as a "bonus extra," Simplot now benefits from strong brand identification from each unit—for each bag is printed in red and blue on a sparkling white background.

This case history is another successful packaging application of an extremely hygroscopic product in Crown Dri-Pak Bags.

The personnel and services of Western-Waxide's Packaging Research and Development Laboratory can turn packaging problems into profits for you! Write or phone your nearest Western-Waxide office today.

*Dri-Pak is a trade mark of Crown Zellerbach Corporation.

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Letters to PACKAGE engineering

Re: Should the "experts" by-pass Purchasing?

Gentlemen:

Your recent editorial, "Should the 'Experts' By-Pass Purchasing?," has aroused wails of outrage and anguish from every corner, and rather than add fuel to the flames, I would instead propose a question to you or to your readers.

I have made a point of considering the total economics of packaging costs, and in most cases throughout the country, I have found that packaging costs are considered to be part and portion of direct manufacturing costs and, as such, carry their assigned share of direct and variable burden assigned to labor operations as well as proportionate costs for development, power, heat, light, materials and so on.

The accounting department generally handles considerations of this nature, and yet in many cases when a salesman is attempting to sell a new concept in packaging, he is able to show savings in labor and associated costs that may well exceed additional cost of packaging materials. Since these associated costs are generally a function of the accounting department and management, then I would pose the question, should the "expert" by-pass purchasing and packaging engineering and take his products directly to the industrial engineering group and to management, or to the accounting department?

Joel Dean of the Harvard School of Business specifically warns that assuming current costs and current cost structures to be continuing is perhaps the most inaccurate method of assessing new operations, and I wonder whether there is any merit in the assumption that the purchasing agent or a strict packaging engineer would desire to enter into this type of analysis with a salesman who is selling a material and method rather than purely materials.

Jack Foeller
Co-Ordinator
Industrial Packaging Sales
Wood Conversion Company
St. Paul, Minnesota

It is often as hard to isolate packaging costs as to pinpoint success or failure. Answering Mr. Foeller about getting a cost-savings story to management: This is the packaging expert's job. Whatever his technical competence, he must know how to interpret his efforts and sell his program to management. Anyone with a different view?

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only the Package *Versaflow-150* gives you both

If your products require the gentlest handling, this Package Versaflow-150 will give you just what you need . . . and over a wide size range. You have straight-through, continuous movement, from infeed to discharge. There are no elevators, no reciprocating motions to upset or damage package contents.

Variable speed drive gives you up to 150 smartly-wrapped packages a minute. A special Versaflow-150 transfer feeds directly from your production line without a direct drive hook-up. The belt infeed receives packages automatically, and feeds them to the chain drive. Sealed ball bearings eliminate maintenance, and centralized lubrication keeps grease fittings away from your packages.

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PACKAGE

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The PULSE / of packaging

Trends to watch:

Thornton Canning Co., Thornton, Calif., is now using **Rheem Manufacturing Co.'s** new "Sterile Pack" process for sterile cold filling of liquiform food products in 55-gal. steel drums . . . The Keller process of making seamless aluminum cans and containers (developed by **Kellver, Ltd.**, Zurich, Switzerland) has been introduced in the United States by **S & S Machinery Co.**, Brooklyn. S & S says this process uses press-type equipment to deep draw aluminum cans at high speed, producing rigid wall cans less than half the weight of tinplate but comparable in strength and dent resistance . . . **Norwich Pharmacal Co.**, Norwich, N. Y., is now using glueable polyethylene. It has a folding carton using polyethylene-coated board specially treated to have a glueable surface, permitting use of dextrin and starch adhesives. This provides a single-ply barrier on a package that handles on standard sealing machinery at "high" operating speeds . . . Finding "optimum" shelf life and correct inventory control are keys to the growth of pressure packaging of foods, according to **Crown Cork & Seal Co.'s** George S. Congdon, manager of its can division technical services. . . .New packaging vistas: **U. S. Forest Products Laboratory**, Madison, Wis., has been drop-testing boxes of unorthodox shapes. It recently issued a report evaluating nine styles of fibreboard boxes with more than four sides . . . Can making speeds zoom: **Continental Can Co.** announces development of equipment turning out metal cans at speeds higher than 750 a minute, 50 per cent faster than previous production lines.

Groups in the news:

The Paraffined Carton Research Council warns food processors of over-packaging. It cautions against packaging for unnecessarily long shelf life and using a seal where not really necessary . . . **American Society for Testing Materials** plans an International Symposium on Plastics Testing and Standardization following the fall meetings of its committee D-20 on plastics. **National Fibre Can & Tube Association** says it received more inquiries than normal during recent weeks from companies whose packaging might be cut off due to wartime shortages. . . . Two-dollar fee pays off: **American Management Association** says the fee charged visitors at its 1958 packaging show assured high quality attendance, provided money for packaging research. AMA will charge the same fee at its 1959 show, will apply the income the same as it did that of the 1958 show.

More expansion for packaging:

The Edlaw Packaging Co., Inc., Glendale, L. I., contract packager, has established a pharmaceutical packaging division. Up to now its activities have centered on food . . . **Monsanto Chemical Co.'s** plastics division plant at Springfield, Mass., has new facilities for producing rubber-modified styrene. This more than doubles Monsanto's capacity to produce the plastic in medium-impact and high-impact formulations . . . **Wright Machinery Co.**, division of **Sperry-Rand Corp.**, now has a West Coast sales and service headquarters in San Francisco . . . **The Cryovac Co.**, division of **W. R. Grace & Co.**, has authorized **The Dow Chemical Co.** to license its customers to use the Cryovac process with shrinking saran bags made by Dow. Cryovac process patents cover the use of shrinking plastic packaging materials used to make skin-tight vacuum sealed packages for various food items, such as meats, cheese, and poultry . . . **Spencer Chemical Co.** will start marketing polypropylene under a four-year sales agreement with **Enjay Co., Inc.**, New York petrochemicals marketing firm. Spencer says that market development quantities of polypropylene will soon be available from a ton-a-day pilot plant, notes that it will produce commercial quantities early in 1960. **Humble Oil & Refining Co.** will make polypropylene for Enjay. Spencer says polypropylene falls somewhat between polyethylene and nylon in many physical properties . . . Another trek to Florida: **Island Equipment Corp.**, formerly of Long Island City, N. Y. recently moved its general office and factory to Miami, where it has 15,000 sq. ft. of manufacturing space. It will maintain a New York regional sales office in Flushing . . . **Chase Bag Co.**, New York, acquired all of the polyethylene film extruding machinery and processes of **Plax Corp.**, Hartford, Conn. Chase plans to make polyethylene tubing and sheeting in a full range of widths and gauges . . . **Olin Mathieson Chemical Corp.** has started making corrugated containers at its new Cincinnati plant. It has a 127,000-sq. ft. factory, is now building a similar plant of 155,000 sq. ft. at Joliet, Ill. . . . **Reynolds Metals Co.** expects to make aluminum foil containers and foil laminated cartons on the West Coast for the first time. Its new foil plant at Torrence, Calif. is nearing completion and new equipment is going into its Vernon, Calif. plant .

Packaging dollars and cents:

A sharp increase in sales of plastic products tempered an over-all sales decline of **Spencer Chemical Co.** Its net sales (for fiscal year just ended) were $45,148,936, compared to $48,262,634 a year ago. Reduced nitrogen sales (due to wet weather this spring that caused deferring some fertilizer applications and abandoning others) interrupted Spencer's ten-year growth pattern. Sales of polyethylene and nylon jumped from 28 to 34 per cent of Spencer's total volume. Domestic plastic resin sales increased 13 per cent . . . **Morningstar-Paisley, Inc.**, reports higher net earnings for the first six months of 1958 than the same period of 1957. Net profit for the 1958 period was $250,911, a 10 per cent increase over the 1957 first half figure of $228,209 . . . **The Dow Chemical Co.** reports sales of $636,201,143 and earnings after taxes of $46,059,181 for its fiscal year ended May 31. Both figures represent declines from the preceding year. Dow blames reduced levels of operation, the cost-price squeeze, and heavy start-up expenses at new plants in Louisiana and Virginia for the lower earnings . . . Second quarter sales and operating revenues of **Olin Mathieson Chemical Corp.** total $148,006,000, an increase of 16 per cent over first quarter sales, and a decline of 4.3 per cent from sales for the second quarter of 1957. Net profits of $5,329,000 for the first quarter were reduced by $2,620,000 by costs of new operations in aluminum, high energy fuels, and solid propellants, and by idle plant costs of Olin's Morgantown, W. Va., nitrogen plant . . . For the first 24 weeks of 1958, **Fort Wayne Corrugated Paper Co.** reports net earnings of $386,757, compared to $327,955 for the same period of 1957. Fort Wayne attributes the improvement to greater efficiency in sales, production and administration . . . Sales for the first half of 1958 for **Diamond-Gardner Corp.** totaled $81,170,000, as against $84,239,000 for the same period a year ago. Net income amounted to $3,577,000 for the first half of 1958, compared to $4,562,000 for the first half of 1957 . . . **Crown Zellerbach Corp.** reports earnings of $14,190,000 for the first six months of 1958, 16 per cent below net income for the first half of 1957. Its second quarter earnings increased 19 per cent over those of the first quarter, with sales and production up 6 and 8 per cent respectively. Crown Zellerbach attributes this to the ending in February of an industry-wide strike in British Columbia, and to the company's usual spring seasonal pick-up. . . . Six months' net income of **Interchemical Corp.** was $1,835,813, compared to $1,894,904 for the first six months of 1957.

What people are doing:

John G. Kain is now assistant director of the containers and packaging division of the U. S. Department of Commerce. He is on leave from his position as

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Wraps products of all shapes—Square, round, oval, oblong, tubular or irregular. Minimum adjustments and down-time for size change-over.
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Wraps single or multiple products per unit at amazing delivery speeds of up to 300 packages per minute!
Savings in Materials
Save up to 60% on materials—eliminate trays or stiffeners unless desired for merchandising value — or product stability.
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Campbell Wrappers give you all!
Examine this wide variety of products and their distinctively different shapes and you'll readily discover how versatile the Automatic CAMPBELL Wrapper really is. Then investigate and learn how much more it provides in efficient, time and money saving operations and why it's the outstanding choice of leading manufacturers everywhere. You won't be satisfied with anything less.
WRAPS WITHOUT BREAKAGE — Whether your products be hard, soft, crisp, delicate or fragile, the Campbell Wrapper tightly "float" wraps the material around your product with the greatest of ease . . . without crush, breakage or other damage!
WRAPS WITH ALL MATERIALS — Paper, cellophane, polyethylene, Mylar, foils and all types of new, modern plastic film packaging materials which are so popular today.
POSITIVE WRAPPER SEALING — By gluing, heat sealing or crimping combinations with ends flared, turned under or diamond folded. The Campbell Wrapper is also available in VACUUM-PAK models for food and other perishable product packaging with positive air-tight sealing guaranteed.
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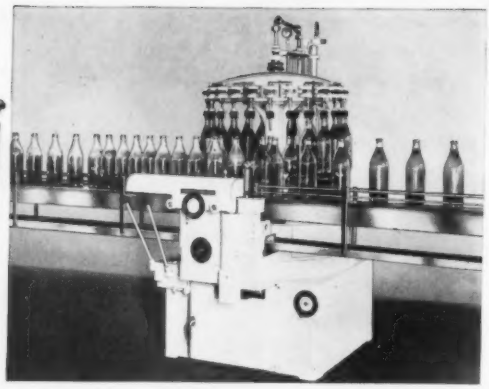

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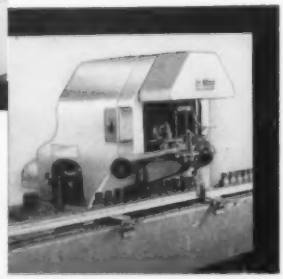
Fast Filling and Accurate Count

Lakso "48" Tablet Counter

- For compressed tablets and gelatin capsules
- Fills up to 100 bottles of 100's per min. Other models up to 300 bottles per min.
- Quick changeover
- Floor space only 27" x 42". Height 56"
- No. 53 Conveyor optional



No. 52 Automatic Bottle Cottoning Machine

- Cottons up to 100 bottles per minute
- Extremely flexible to handle wide range of bottles and cotton.

For complete information write

THE Lakso COMPANY, INC.
FITCHBURG, MASSACHUSETTS

president of Star Box & Printing Co., Inc., Chattanooga, Tenn. Mr. Kain succeeds **Robert J. Williams,** who returns to his firm, Cadillac Products, Inc., Detroit . . . **Livingston B. Keplinger,** president of the Steel Shipping Container Institute, is now chairman of the executive committee of Copperweld Steel Co., Pittsburgh . . . **"Tas" Papodopoulos** of the engineering department of Seagram's Ltd., Ville LaSalle plant, was named top student at McGill University's packaging materials and processes course, was awarded the Griswold engineering scholarship. This lets him spend a month (expenses paid) at any educational institution in Canada or the United States conducting a recognized packaging course . . . **James Bailey,** developer of the plastic bottle and consulting engineer, Plax Corp., Hartford, Conn., is one of three American inventors receiving Edward Longstreth medals from the Franklin Institute, Philadelphia. The institute awards the Longstreth medal for inventions of high order and for meritorious improvements and developments in machines and mechanical processes. Mr. Bailey gets his for developing methods of successful commercial manufacture of unbreakable plastic bottles . . . **Dr. Walter A. Maclinn** is now director of the Refrigeration Research Foundation, Colorado Springs, Colo. He was previously chairman of the department of food science, agriculture experiment station, Rutgers University, New Brunswick, N. J. . . . **Gerard S. Fowler** is now executive vice president and general manager of Richard Hudnut, division of Warner-Lambert Pharmaceutical Co. He was previously vice president and director of sales . . . **Lawrence E. Arneson** is now plant manager of the Morris Paper Mills carton plant, Morris, Illinois, a division of Federal Paper Board Co., Inc., Forty-three years with Morris, Mr. Arneson was previously technical superintendent. Federal also named **Richard E. Buck** superintendent at Morris, responsible for carton plant operations. Mr. Buck was previously on the production staff of Federal's Lindley box division, Marion, Ind. . . . New technical director of the Personal Products division of Thomasson of Pa. Inc., Norristown, Pa., aerosol filler, is **Donald F. O'Brien.** Prior to joining Thomasson, he was packaging chemist and supervisor of aerosol products of Colgate-Palmolive Co. . . . **A. G. Handschumacher** is now corporate director of research and development of Rheem Manufacturing Co. He continues as vice president and general manager of Rheem's electronics division, heads the new corporate department of research and development at Downey, Calif. . . . tries . . . **C. C. Johnson,** sales manager, Rhinelander Paper Co., Rhinelander, Wis., has assumed functions formerly held by **W. J. Davis,** who becomes general manager of the paper department of kraft and converting products division of St. Regis Paper Co. **E. L. Mason** is new assistant sales manager at Rhinelander and **E. G. Peterson** succeeds Mr. Mason as manager, mill sales department . . . New vice president of Clupak, Inc., is **Hewitt Welsh.** *(End)*

Even pouring rain can't harm these heavy-duty polyethylene shipping bags, pioneered by Spencer Chemical Co. Here hygroscopic ammonium nitrate is being stacked in open field during recent rainy season. Also, two years of tests show 25 to 50% less bag breakage with polyethylene compared to kraft paper.

Read why Spencer Chemical Company has decided to use

Heavy Duty Polyethylene Bags To Ship Thousands of Tons of Fertilizer:

Two years of tests show bags give complete moisture protection, cut bag breakage to 0.77% or less . . .

Many large-scale industrial shippers will be interested in Spencer Chemical Company's decision to trust their own products to a new heavy duty polyethylene shipping bag. For this decision is the best possible proof of Spencer's own faith in that bag, pioneered by Spencer over a two-year period.

This fall Spencer will start shipping thousands of tons of "Mr. N" Ammonium Nitrate in 10-mil polyethylene bags. It was an important decision, made only after a series of grueling tests.

In over 2½ million lbs. of shipments of "Mr. N," only 0.77% of 51,240 bags were broken. In a test involving shipments of polyethylene resin, breakage was only 0.72% — less than half of kraft paper's 1.5%.

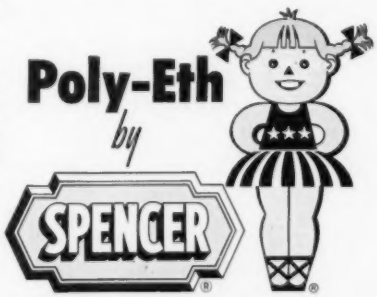
Material loss is slight, even when bags are broken. For instance, one dealer reported the loss from eight broken bags in a car of fertilizer was less than one quart. Further, broken bags can be easily repaired with pressure-sensitive tape.

Completely moisture-proof, these bags can be stacked in an open field, even in pouring rain. This feature is of major importance, not only to "Mr. N," but to nearly all hygroscopic products. It means, too, that feeds and food products can be stored for months with practically no moisture loss.

These bags are easy to heat-seal. Fifty pound bags of ammonium nitrate can be filled and sealed at the rate of 16-20 bags per minute per machine — a speed comparable to rate for 50 pound paper bags. All bags are corrosion-proof, non-toxic, and contamination-proof.

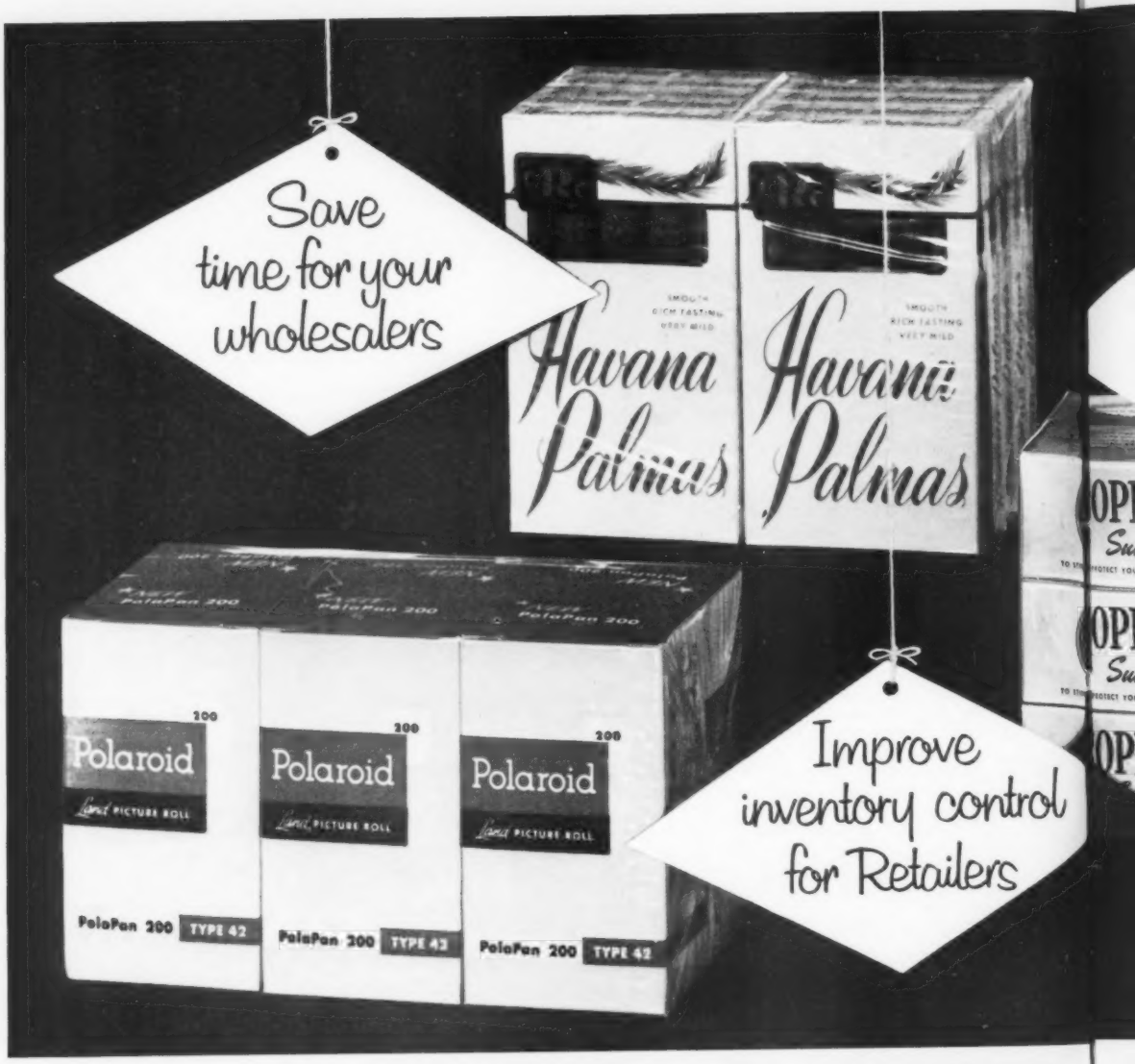
If you're an extruder, find out more about Spencer "Poly-Eth" Polyethylene, the super-tough resin used in pioneering these new bags. If you're a packager, ask where you can get these extra-protective bags for your own product. See a Spencer salesman or write to Market Development Section, Spencer Chemical Co., Dwight Bldg., Kansas City 5, Mo.

Packaging Institute's 20th Annual National Packaging Forum Oct. 13, 14, 15, 1958 Edgewater Beach Hotel Chicago, Ill.



SPENCER CHEMICAL COMPANY

Dwight Building . . . Kansas City 5, Missouri



...BUNDLE WITH

Manufacturers save as much as 25% on total packaging costs by bundling with AVISCO cellophane. It eliminates the need for printed cartons or printed wraps for fractional units; operates faster and more efficiently on packaging lines; seals easily and securely with heat, thus ending the glueing operation. New packaging flexibility over cartons is also offered because bundle sizes can be changed simply by adjusting the machines. Even more, cellophane bundling reduces shipping carton sizes, shipping weights and the amount of warehouse space needed for packaging materials.

For more information circle No. 211 on Reader Service Card

AVISCO® CELLOPHANE

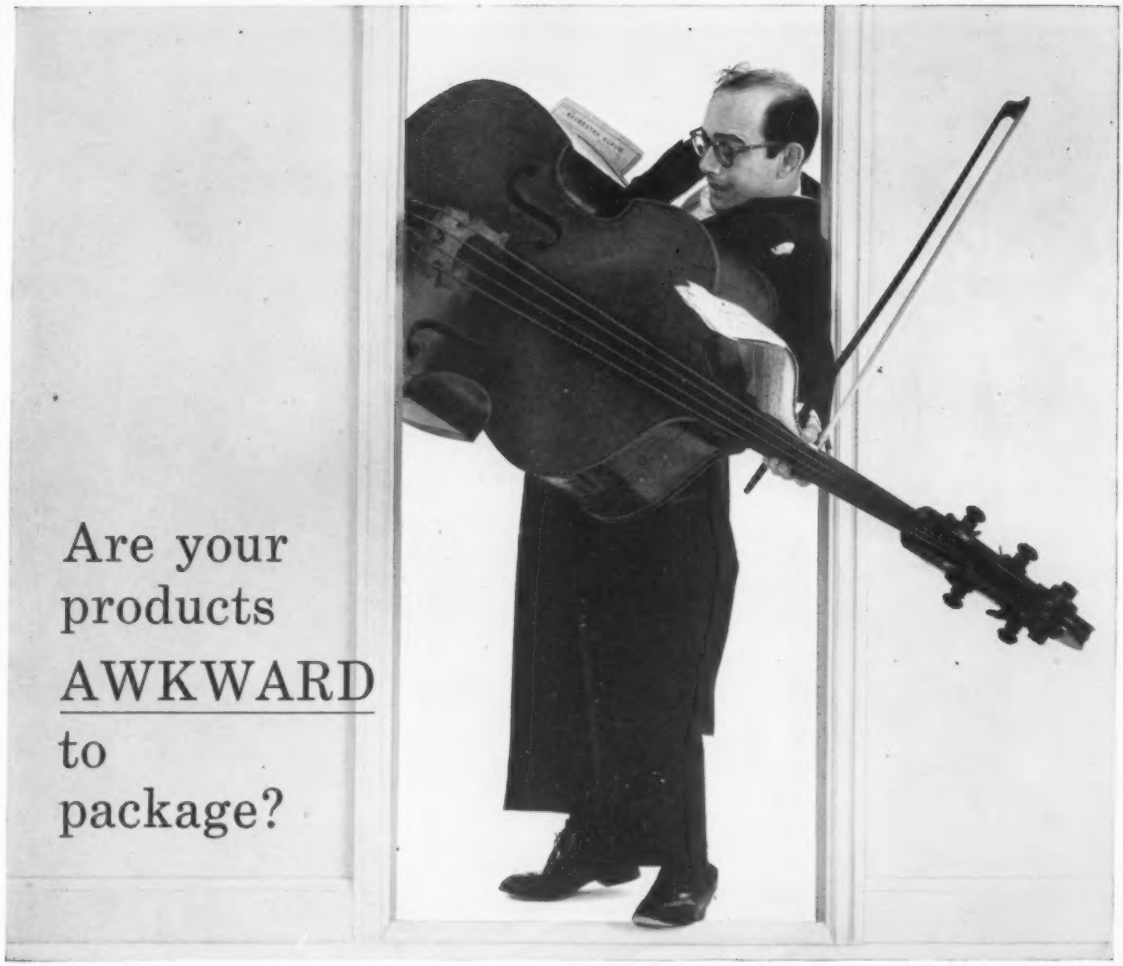
For your wholesalers—Making up an order becomes easy because cellophane's transparency permits instant identification—faster count. Cellophane also gives complete protection against dust and moisture—and seals in freshness.

For your retailers—Identification and handling are easier. Bundles can be used as shelf displays without unwrapping, thus assuring fresh, clean stock—while sparkling AVISCO cellophane adds dramatic appeal to increase product sales.

Call your AVISCO salesman. He'll supply you with 300 MS-1 cellophane for small units and 450 MS-1 for larger, heavier units.

AVISCO®

AMERICAN VISCOSE CORPORATION, FILM DIVISION, 1617 PENNSYLVANIA BOULEVARD, PHILADELPHIA 3, PENNSYLVANIA



Bemis flexible packaging may solve your problem

WHAT'S MORE AWKWARD than half-empty coffee cups and food trays? If you've wondered what the hostess does with this mess, she puts it in a Bemis paper bag! Proved in government service, the polyethylene-coated paper won't leak for 24 hours. Want a packaging idea that'll hold water? Contact Bemis.

EXPENSIVELY AWKWARD! The big 4′ x 8′ sheets of highly finished plywood *were* a packaging nightmare—before Bemis. Now, light, inexpensive, beautifully printed Bemis PSP bags are effecting savings all along the line—factory, shipping and retailing. Could Bemis *flexibility* effect graceful savings for you?

Where flexible packaging ideas are born

Bemis

Bemis may already be making the better package you need. Write: Paper Specialty Plant, 1058 S. Vandeventer, St. Louis 10.

"Label coding expert

...that's me—with a Tickometer"

"Every package that goes out of here has to be coded. We used to pre-print codes, and got stuck with piles of labels and small cartons that couldn't be used. We rubber-stamped codes by hand —too slow and messy. Now with the Tickometer I can code in an afternoon all the packages and labels needed by all our production units the next day. We're never out of the right carton, and have cut our inventories to a fraction of what they used to be. We save on printing and avoid waste on pre-printed cartons and labels that are out of date."

—From an actual case study.

- With a Tickometer you can code labels and small flat folded cartons at speeds up to 1,000 a minute—imprint only enough for current production. And avoid big inventories, carton waste, and reduce printing bills.
- The Tickometer gives close register, and with an impression surface 2⅜ by ⅞ inches, prints on most paper weights and finishes, light card stocks, foils, cellophanes and plastics. Handles sheets from 1 by 2 up to 15 by 15 inches, depending on the model. Feeds and stacks automatically, is easy to run, doesn't need a skilled operator.
- It can also be used to mark, date, endorse, cancel forms, tickets, tags, checks, sales slips, etc.—at considerable saving in time and work. And can be equipped for consecutive numbering.
- It also counts—so accurately—banks use it to count currency! Can be set for a predetermined amount, gives partial amounts or totals, provides figures faster, and earlier records.
- You can buy or rent a Tickometer. Coast-to-coast PB service is available from 302 points. Ask the nearest Pitney-Bowes office for a demonstration. Or send coupon for free illustrated booklet and case studies.

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TICKOMETER

Imprinting & Counting Machine

Made by the originator of the postage meter . . . offices in 107 cities in U.S. and Canada.

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Send free Tickometer booklet and case studies

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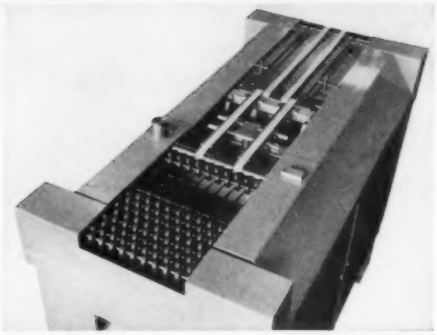
fmc sets the pace in high speed electronic check weighing



...400 packages per minute "on the fly"

At speeds never before possible, you can now check weigh all your production with unvarying accuracy. Depending on gross package weight, the new FMC Electronic Check Weigher senses variations of as little as plus or minus ½% at a rate of up to 400 packages per minute.

With a constant speed, no-stop motion, this new check weigher takes the production from one or more filling lines via high speed conveyor, weighs and segregates each package according to preset tolerances for over or under weight. Fully automatic, it operates without an attendant.

The new FMC Electronic Check Weigher handles round, conical, rectangular, oblong or irregular packages up to 10" wide by 10" long. Package weight ranges from 1 ounce to 1 pound or from 8 ounces to 3 pounds. Controls for setting weight tolerances are simple and readily accessible on a side panel. Recording instruments and numerical counters are supplied if required.

Extremely compact, the unit is only 48" long by 24" wide. The height is adjustable from 30" to 42" to fit into any existing production line.

For descriptive literature, write to...

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION

FMC Packaging Machinery Division

Stokes & Smith Plant

4994 SUMMERDALE AVENUE, PHILADELPHIA 24, PA.

Wholesale florist reports stapling 3 times faster than previous method.

Huge stapled carton cuts packing time for 14-foot boats by 50%.

Stapled cartons for nails cost less and weigh less than wooden kegs.

Slash your shipping room costs with Bostitch stapling

Stapling is faster than taping for sealing cartons of lighting fixtures—holds better, too.

Extra profits and competitive advantages were formerly hidden in these shipping rooms. They were found when the change was made to light, rugged corrugated cartons sealed with Bostitch stapling.

Gone are the wastes of outmoded closure methods. In their place are combined benefits of many Bostitch savings.

Bostitch stapling is faster than other closure methods. Staples cost less than other fastening materials. Strong stapled containers carry heavy goods safely and cushion fragile contents in shipment. Shipping costs of stapled corrugated containers are lower than for heavier materials.

350 Bostitch Economy Men work out of 123 U. S. and Canadian cities. Your nearest one will give you facts on shipping room stapling savings. You'll find him under "Bostitch" in your phone book, or mail coupon below.

Whatever you ship, Bostitch savings can give you an important competitive advantage. Send for *free* Shipping Room Booklet.

Bostitch, 870 Briggs Drive,
East Greenwich, Rhode Island

Name _____

Company _____

Address _____

City _____ *Zone* ____ *State* _____

Please send me your Shipping Room Booklet.

We now ship _____ (Product) in _____ (Kind of container).

Fasten it better and faster with

BOSTITCH®
STAPLERS AND STAPLES

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everything you sell
deserves the protection of

WAXED
GLASSINE

facts and figures,
coast to coast,
prove that

Sales-Power Packaging Begins With Lower-Cost Waxed Glassine

Licks every packaging problem, inside and out, with the greatest of ease! Protects best, prints best, pulls best with pre-sold shoppers! All this—at lower basic cost, too!

THE POWER OF WAXED GLASSINE OUTER WRAPS:

- **More eye appeal**—Outshines them all with brighter, more lifelike picturing of your product. Whets appetites, stimulates more unplanned sales at point-of-purchase!
- **Billboards your brand**—Brilliant designing, over the entire package if you wish, gives your brand that can't-miss *billboard* impact! Here's product identification that's an irresistible invitation with mounting acceptances in sales, repeat sales.

INNER AND OUTER WRAPS OF WAXED GLASSINE MEAN:

- **Extra flavor protection**—Retains all that wonderful taste and flavor for consumers to enjoy, brings them back for more!
- **Extra freshness protection**—Self-sealing Waxed Glassine guards against damaging moisture, keeps product freshness and texture at their appetizing best for longer store and home life. Opens easily, closes tightly.
- **Extra grease resistance**—Waxed Glassine wrappers guard against penetration by fats, oils, shortenings; prevent rancidity. Packages keep clean, fresh, tempting!
- **Extra strength**—Sturdy Waxed Glassine passes every test of shipping and handling. Stacks better, cuts costs from crumbling, breakage, ripping and returns!
- **Lower cost**—Lower basic cost and an ever-available supply make Waxed Glassine the economy package with a profit-plus!

Waxed Glassine teams up with the experience and know-how of the nation's top converters and designers, gives your product the protection and modern design packaging that build bigger brand business. For expert packaging help, see your Waxed Paper salesman today. Or write us, phone us direct.

WAXED PAPER MERCHANDISING COUNCIL, INC.•38 S. Dearborn St., Chicago 3, Ill., STate 2-8115

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Circle No. 217 on Card

"The new look in BRECK shampoo packaging! Beautiful, lightweight, unbreakable, plastic jars, molded from

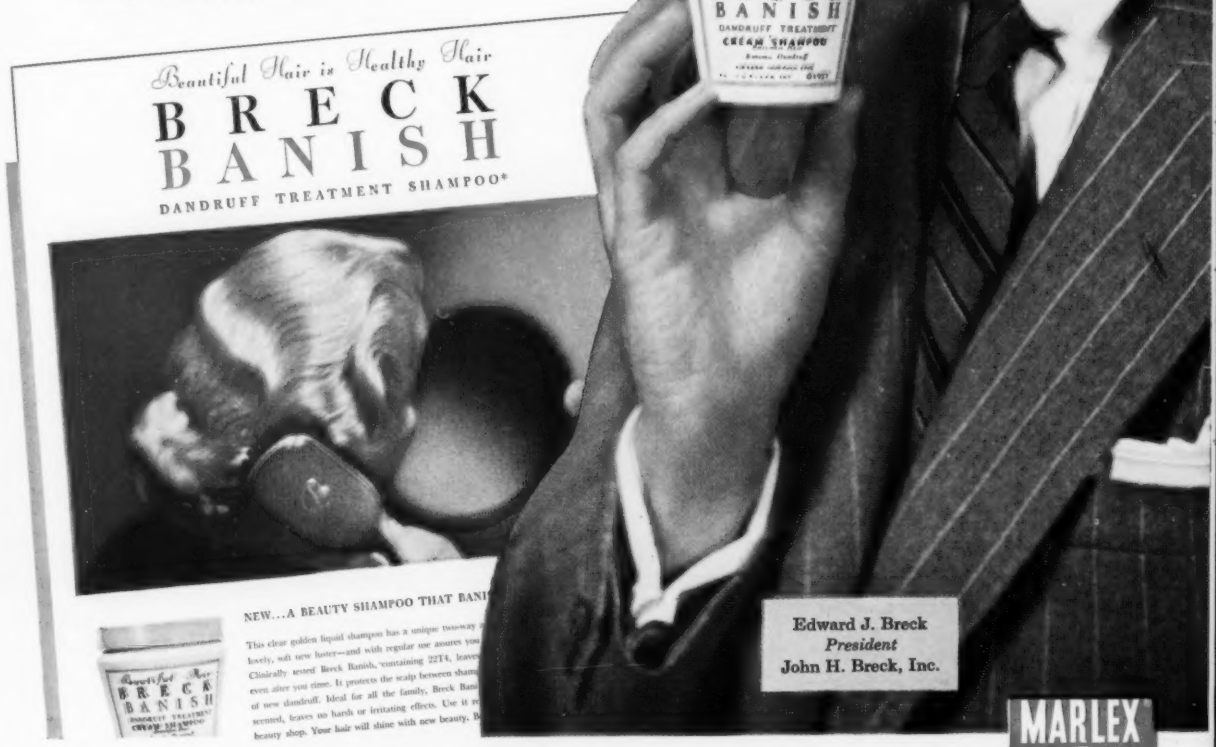
MARLEX*"

Designed and blow-molded by PLAX, this attractive 6-oz. widemouth contour jar has strong, thin walls that are shatterproof and chip-proof . . . safe in the bathroom . . . perfect for travel. The new tapered contour design is easy to hold, and the surface is gentle to the touch.

In addition to being first in the cosmetics field with this revolutionary new package, Breck saves more than 5 pounds per case in shipping weight, since the new jar has 1/10th the weight of a comparable opal glass jar!

This is just one of the many profitable new packaging possibilities with MARLEX . . . others include transparent film, squeeze bottles and tubes. No other type of packaging material is so versatile and economical.

*MARLEX is a trademark for Phillips family of olefin polymers.



Edward J. Breck
President
John H. Breck, Inc.

MARLEX
Phillips 66
A PHILLIPS 66 PLASTIC

PHILLIPS CHEMICAL COMPANY, Bartlesville, Oklahoma

A subsidiary of Phillips Petroleum Company

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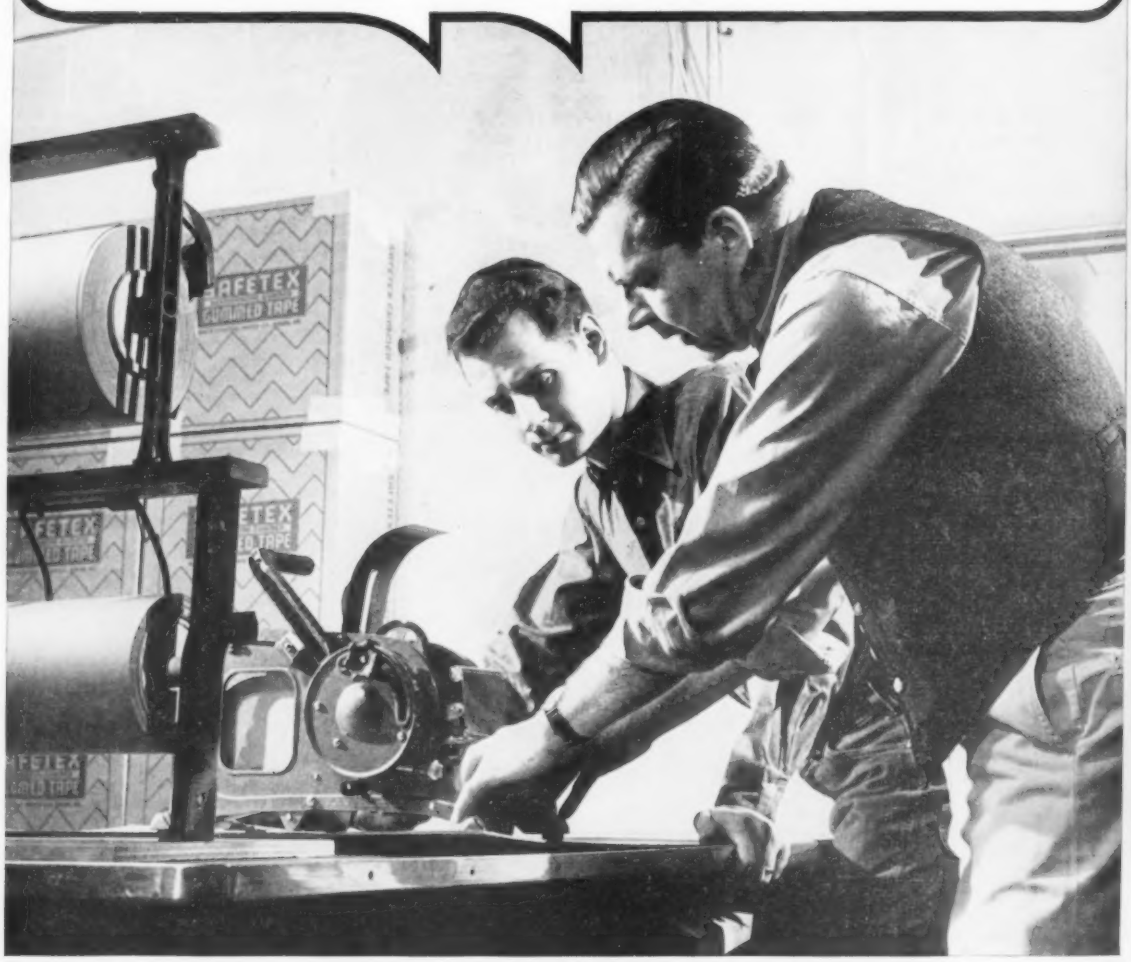
So the idea is to keep the brush clean
and the water cup full?

Right, son! And when you run out, the tape is right over there.

Safetex?

Safetex!



Your Shipping Department *needs* a gummed tape that seals the *first* time, *every* time. That's why Safetex is made under such rigid control—from parent roll of paper to carton-packing for shipment. Let Safetex prove itself in *your* shipping room.

SAFETEX | SUPERSTANDARD GUMMED TAPE

CENTRAL PAPER COMPANY • MENASHA, WISCONSIN

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Circle No. 219 on Card

Simoniz
puts "protection"
in a can

Packomatic®
puts the cans in a case

Packomatic equipment feeds, forms, positions, loads, seals and imprints corrugated shipping containers automatically. However you ship—in multi-ply paper bags, or in corrugated shipping containers; whatever you "package"—a can, a carton, a box or a bale—there's a Packomatic machine designed to handle your shipping container requirements. Packomatic machines, geared to your production line, will feed, form, position, load, seal and imprint corrugated containers automatically—or do any of these operations singly as a complement to your existing packaging facilities. Let one of our sales engineers suggest the start of a long-range packaging program for your plant. Investigate the Packomatic method of cutting costs and boosting production. Call, write or wire today.

Fully-automatic Packomatic Case Former-Loader, part of a fully-automated production line at the Simoniz plant, Kankakee, Illinois. Other Packomatics on the Simoniz line include Case Sealers and Case Imprinters.

Begin to automate your packaging line with this high-speed, fully-automatic Case Sealer. Aligns loaded cases, positions flaps, glues, seals and discharges — and no operator needed! Available in wide range of sizes. Semi-automatic, too. Call or write for additional information.

J. L. FERGUSON CO. Joliet 1, Illinois

PACKOMATICS include the Bale Sealer • Case Sealers • Opener-Loaders • Case Imprinters • Telescoping Volumetric Fillers • Packer-Gluers • Semi-automatic or fully-automatic.

CAPPED WITH ALCOA CLOSURES TO PREVENT EVAPORATION . . . PACKAGED IN ALCOA WRAP FOIL TO PROMOTE SALES

Before Tintair had even been given its name, Bymart-Tintair, Inc. chose aluminum foil as the finest packaging to protect and sell their new fashion Home Hair Coloring.

They selected ALCOA® Roll-On Closures as far superior to ordinary screw-caps—as the best, most efficient seal for preventing evaporation and preserving the fine color balance of delicate tinting fluids.

Mr. Raymond Loewy strongly approved the choice of aluminum foil for the package . . . he supplied the design that the Paperboard Laminating Division of H. D. Catty, Inc. and ALCOA followed to create Tintair's distinctive, sparkling box.

Does your packaging need improving? ALCOA teams with America's top converters to assure you the best facilities, know-how and service—all along the line. For full information, call your local ALCOA salesman, or write: ALUMINUM COMPANY OF AMERICA, 1651-K Alcoa Building, Pittsburgh 19, Pa.

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

You're always ahead with Alcoa
. . . greatest name in aluminum

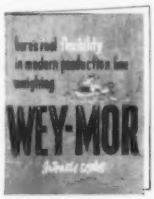
Sweet and Gentle... The Story at Wayne Candies

Wayne Candies, Inc. Fort Wayne, Indiana, recently installed a Wey-Mor automatic weighing and bag-filling machine to provide gentle treatment to a wide variety of candies. The equipment is used to handle items Wayne manufactures as well as those it re-packages under its own label. Some of the items handled on the Wey-Mor include Flavored Puffs, Cinnamon Imperials, Rum & Butter Toffee, Pineapple Slices, Rainbow Mints and a wide variety of other items.

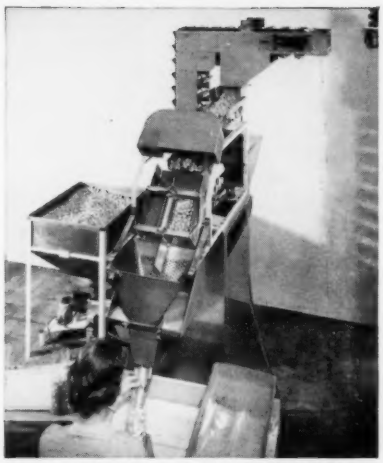
Since installing the equipment, Wayne Candies has increased its production enough to save 10% on bagging costs and has reduced material losses by approximately 50%.

Extremely smooth, fast delivery is particularly important to assure perfect package appearance of a fragile candy like Wayne's Flavored Puffs. Wey-Mor meets all requirements because it features a vibratory feed along its entire length, not just at the bulk and dribble point. This eliminates friction and breakage of the candy.

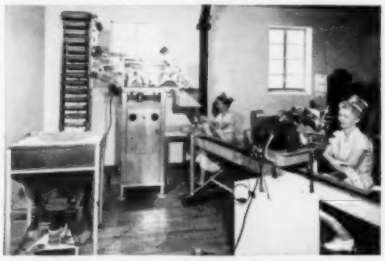
Wey-Mor will be a "sweet" addition to your packaging operation! See how it can improve your product's appearance and cut your production costs. Write for full information.



Write for Illustrated Wey-Mor Folder that demonstrates true flexibility in production-line weighing.



Close-up shows detail of Lynch Wey-Mor. Vibratory feeder brings product forward to the bulk (2 outside channels) and dribble (center channel) point. Machine is quickly adjusted for any amount from 8 to 16 ounces . . . automatically discharges when proper weight is reached.

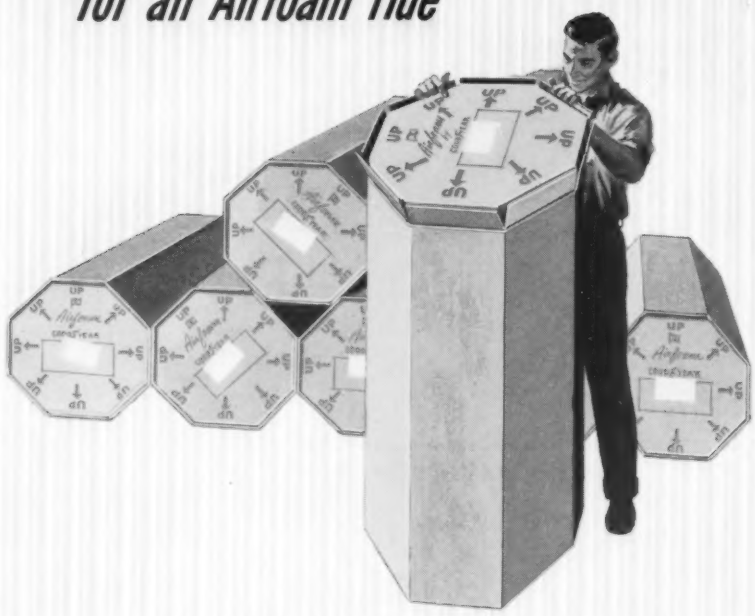


Wayne's packaging team includes a Lynch Robo-Lift which is synchronized with the Wey-Mor scale to assure a steady flow of candy. One girl keeps hopper filled, one handles filled bags, one labels them and another cases the finished product.

These are among the items Wayne Candies, Inc. packages with their Wey-Mor Automatic Weighing Machine: Flavored Puffs, Cinnamon Imperials, Rum & Butter Toffee, Pineapple Slices and Rainbow Mints are among the hundreds of varied items bagged on this high speed machine.

LYNCH
CORPORATION
Anderson, Indiana

Corrugated cushion for an Airfoam ride



This H & D corrugated drum makes rolls of Goodyear Airfoam easier to pack, more economical to ship. Flexible ends provide protection against compression and shock. Packaging problem? Better see H & D.

HINDE & DAUCH

Division of West Virginia Pulp and Paper Company

AUTHORITY ON PACKAGING • SANDUSKY, OHIO
15 FACTORIES • 42 SALES OFFICES

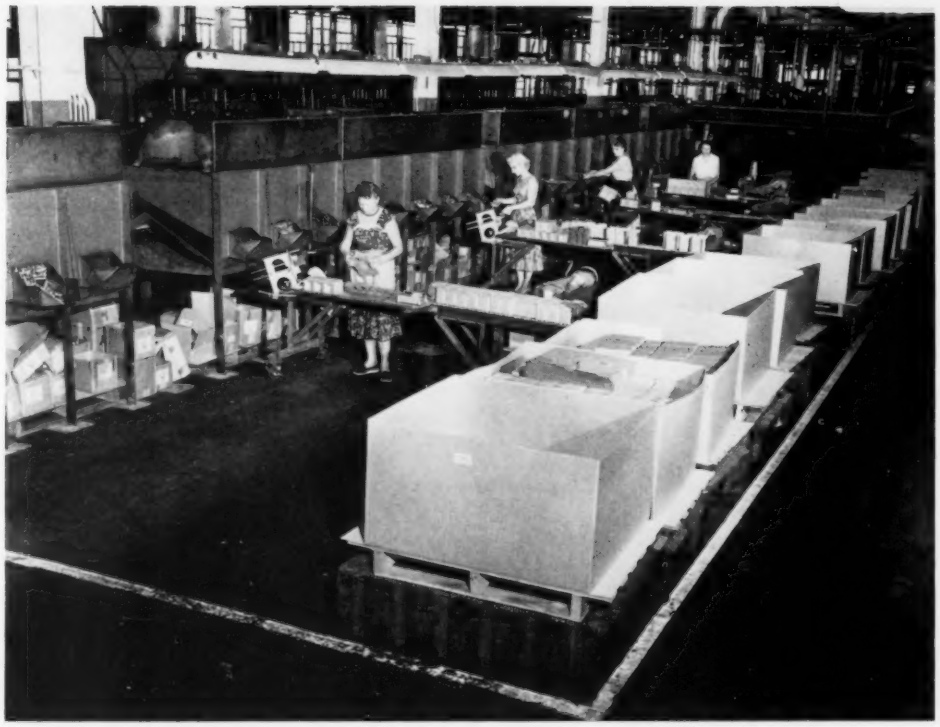


Fig. 1. Four mobile packaging stations move up and down line of 25 bins. Depressed table at left of each station (on girl's right as she faces station) holds whichever loading device needed. Finished individual packages go into pallet loads seen at right. In devising new operation, Crane engineers gained enough space to provide aisle at right.

Packaging group pays off: New operation succeeds

A new packaging floor layout, special equipment of its own design, improved work methods and flow, let Crane Co. package its pipe nipples in standard quantities—and handle greater volume in less time.

To meet demands for pipe nipples packaged in quantities of 25, Crane Co., Chicago valve, fitting, plumbing, and heating manufacturer, launched a packaging group to develop and install a packaging program using these quantities. By modifying existing facilities, revising its floor plan, installing its own specially-built equipment, and consolidating its package requirements, this team of specialists spearheaded the switch. (See Fig. 1)

Result: The nipple shop of Crane's Chicago plant increased its rate of production. In moving from its previous system of jumbled packs of 25, 50, 100, and 200 nipples to a standardized 25-pack, Crane increased its labor and materials costs—which were offset, however, by improved layout, methods, and equipment.

Diversity of items posed a challenge. Crane packages 186 different nipples. These are either black

Fig. 2. Team of experts developed Crane's new operation: (Left to right) Clyde Hall, packaging engineer; John Budz, nipple shop foreman, and John Griffin, materials handling engineer, watch Tony Vladoff, machine design engineer, demonstrate one of his loading devices. He pulls lever, thus moving loading platform from 30° angle to horizontal position. Angled support drops to horizontal position serving as bridge from loading platform to skate conveyor.

or galvanized and range from 1/8- to 2-in. sizes. Length varies in 1/2-in. increments up to 6 in. long. Smallest size handled is smaller than the tip of a man's little finger. Largest size is 2×6, which means it is 2-3/8 in. in diameter by 6 in. long.

To package all these, Crane uses 27 corrugated boxes and folding cartons, as well as two sizes of polyethylene bags. Gross weights of standard packages of 25 pieces each range from 1.4 to 43.4 lb.

Experts Pool Their Talents

To bring about packaging in standard quantities and to streamline the old operation that more or less grew up with the plant, Crane assigned a team of experts: Clyde Hall, packaging engineer; John Griffin, materials handling engineer; Tony Vladoff, machine design engineer, and John Budz, nipple shop foreman. It became their job to make a combined attack on the problem under the direction of Jack Vander Molen.

Focal point of old and new packaging of nipples is the plant's use of 25 bins lined up in a row. These hold quantities of the different nipples as received from production and serve as hoppers leading to the packaging stations. But bin capacities were inadequate. A girl could package for only 30 minutes without having to change bins or await a refill. A conveyor running parallel to the line of bins added little to packaging efficiency.

Fig. 3. After positioning 25 nipples in loading device, she flips handle thus moving locked-in nipples about 180° so that all 25 are in place for box loading. When she pulls handle at left (after positioning box on chute) nipples go into box.

Fig. 4. Pulling handle not only forces nipples into box resting on shoe, but keeps on pushing them so that box and nipples drop on chute, thus landing upright on skate conveyor—ready for taping and transfer away at left.

Old Way Posed Problems

There were too many delays going from the packaging of one item to another. There were too many set-ups and they took too long to make. Work places were separated and a girl had to move from one place to another in the course of completing a run. They had the problem of inaccurate count by weight. There was poor provision for moving filled boxes. Packers had to wait for available space.

Two ways to count. They had both manual and weight counting. Packaging was in various quantities, including 100's, 200's and 50's. Methods were inefficient. Girls had to lean over conveyors to reach for items to package. There was too much non-productive walking back and forth. Several points of concentrated activity became areas of confusion because so much was going on.

Boost Bin Capacity

First attack was on the bins. The group ordered a superstructure built to raise the bin walls, thus increasing bin capacity nearly 100 per cent. This alone made it possible for a girl to package for one hour, rather than 30 minutes without having to stop for a bin change.

Next focal point was development of four mobile packing stations to operate along the line of bins. Out went the long stationary conveyor running parallel to the line of bins. In went four short mobile conveyors perpendicular to the bin line. These were equipped with packaging stations to operate up and down the line, where required. Further, the engineers gained enough from this layout improvement to permit a 7-ft. aisle. The entire packaging area, including space for bins, is now just 65 ft. long by 18 ft. wide.

Each of the four mobile packaging stations mounted on casters has an 8-ft. length of skate conveyor. Attached to, and at the same level as, the conveyor is a shelf running about half the length of the conveyor. Perpendicular to, and mounted at a lower level than, the conveyor is a metal table. The different packaging devices and equipment rest on this end table.

Need a firm surface. The two casters at this end of the table are locking, thus permitting a firm surface while packaging takes place. At the other end of the conveyor is a locking load bar which holds boxes on the conveyor until released. When dropped, this bar acts as a bridge to facilitate transfer of boxes or cartons off the skate conveyor at the pallet loading station.

Serving each of these packaging stations is a utility table 36 in. square, 30 in. high, also mounted on casters. Tape dispensers rest on this table. There is a clamp for each table so it can be locked in place while the girl is drawing tape from a dispenser.

Devices To Load Boxes

Each packaging station is equipped with an interchangeable loading device. Currently the plant uses three different loading devices and plans to use others. Two of the three were developed by machine designer Tony Vladoff.

One of these devices is designed for the smaller sizes of nipples. It has two V-shaped troughs. One is fixed, the other moves as though hinged. A girl places ten pieces

Fig. 5. Loading device holds waiting boxes at angle of 30° while she place-packs pipe nipples in boxes. When loaded, she flips lever (as demonstrated by Mr. Vladoff in Fig. 2) thus uprighting load for movement down skate conveyor.

Fig. 6. Too small for arranged packaging, these pieces are jumble-packaged by a count-by-weight method. When packing polyethylene bags (not shown), she uses a scoop to hold weight-counted nipples, then dumps scoop into bag.

in the fixed V-trough, then flips a corrugated metal locking guide over these ten, which locks in place, thus holding the pieces in the trough.

Completing the loading. Next she puts 15 pieces in the other V, then flips it over (see Fig. 3) so that all 25 are arranged for loading into a box. Then she puts a corrugated box on the horn of the device and pulls the handle. As she does this, the action pushes 25 pieces into the waiting box. Then it keeps on pushing the pieces and the box to a chute that provides a 90° turn downward. This lands each box upright (open end up) on the skate wheel conveyor. (See Fig. 4)

Another Way To Load

To handle pieces too large for loading with the loading guide described above, Mr. Vladoff devised another type. It features a table inclined to approximately 30°. This is enough so that when a box rests on it open end up, the nipples can be dropped into and stacked directly in the box without falling over. (See Fig. 5) As soon as a load is complete, the girl pulls a lever, which causes the inclined table to right itself to horizontal position.

As this happens, the bar, which acts as a guide to keep the box from falling off while being loaded, drops to horizontal position and serves as a bridge leading from the loading device to the skate conveyor. Next, the girl merely slides the filled box over this bridge onto this conveyor.

Doing It By Weight

A third box loading method involves an over-and-under scale. For its smallest nipples, the Crane engineers established a count-by-weight method. A girl weighs 25 units into a box or weighing pan and packages them jumbled. (See Fig. 6) When using a polyethylene bag instead of a box, to fill the bag there is a scoop to hold the weigh-counted nipples and the girl merely dumps the scoop into the bag.

As a general rule, Crane avoids packaging on a basis of count by weight. However, the smallest sizes, which are difficult to arrange, justify jumbling and counting by weight, according to the Crane engineers.

Package Specifications

Corrugated boxes are die-cut, locking bottom, four-flap top, with offset scores. Most boxes have a three-score top. Board ranges from 125 to 200-lb. test, and is all B-flute. Weight plus dimensions determine the test board used for a box serving a particular size of nipple.

Reason for these triple-depth boxes with multiple scores is that Crane can package three different lengths of nipples in each box, thus reducing inventory and buying boxes in larger quantities. Folding cartons are of 0.038–0.040 kraft, locking bottom, four-flap top and offset scores. Both corrugated boxes and folding cartons are of this locking bottom style.

Crane uses two sizes of gummed labels. These are designed as shelf labels and can be read at a distance. They are color-coded for "black" or galvanized items and show such information as quantity and size. Polyethylene bags are of 0.003 polyethylene tubing. Labels for these bags are in the form of printed cards inserted in the bags. Once filled, these bags are folded over twice, and stapled.

Labeling And Taping

The girls use standard label moisteners to wet the labels prior to applying them to corrugated boxes or folding cartons. Ordinarily they label about 25 boxes prior to loading them with nipples.

Once the boxes are filled and ready for closing, the girls seal them with tape. For cartons and boxes of 10-lb. gross weight and over they use a 3-in. wide reinforced gummed paper tape. Two or three-inch non-reinforced tape serves packages of lesser weight. Girls do the taping on the skate conveyor prior to moving the boxes to the pallet loading station.

Moving Out Finished Packages

Completed individual packages move to the end of the skate conveyor where a service man handling the production of all four of the packaging stations places them on their respective pallets. These are not shipping packages, but open containers for in-plant movement. There are 12 to 13 pallets lined up parallel to the row of bins.

The stock man puts a chipboard riser or separator on top of the pallet. He then places a corrugated tube on top of the chipboard and stacks filled, closed boxes within the tube. This unit-load is transported to the Crane stockroom (about a block away) where the order filler cuts away the front or fourth side of the tube and proceeds to draw stock from the three-sided, bin-like box.

New Way Pays Off

The Crane group cites a number of advantages inherent in these major changes in the packaging of pipe nipples. Going to an arranged pack has *increased* the number of cartons or boxes handled with the *same* number of people — thus stepping up the rate of production generally. The new layout has eliminated the non-productive walking back and forth. Increased bin capacity has reduced set-ups and favored longer runs. There is no more manual counting and the use of loading devices has taken the guesswork out of packaging.

A major feature of Crane's new packaging operation is the use of arranged packs of greater user convenience appeal. Big advantage of this over a jumbled pack is that an arranged pack supports itself. A jumbled pack is satisfactory for the smaller pieces, but the large ones must be arranged in an orderly way for effective packaging and stacking.

Not only do the girls have the benefit of new equipment, but also detailed instructions. These show line personnel step by step just

(*Continued on Page 78*)

How we teach package engineering on the job

Here are suggestions useful to anyone concerned with planning, conducting, and following through on-the-job training in package engineering. The scope and size of this program at Eastman and the results attained merit careful attention.

By Kenneth R. Marvin,
Technical Advisor,
Industrial Engineering Division,
Eastman Kodak Company,
Rochester, New York

Management considers job-related training as a supplement to and extension of formalized training which our people receive at schools and universities. It is the policy that training throughout the entire organization shall be encouraged.

Engineer Does Whole Job

It is the responsibility of the division to develop engineers capable of handling *all* phases of industrial engineering on complex problems. **Our experience has shown that most effective results are achieved by an engineer handling all phases of the problem, rather than each function such as operation analysis, layout, packaging, etc., being undertaken by specialists in these areas.**

This requires more than the formal education the man has as he becomes a member of the division. It requires indoctrination in how each function of industrial engineering is applied to the problems encountered in our company operation.

Both instruction and experience are necessary to train the engineer in the coordination of interests and responsibilities required to accomplish the job effectively and sell his recommendation to the interested people. This requires broad experience in processes, policies, and organization.

Courses Match Job Needs

These programs are intended to supplement and augment the formalized training the engineer has as he comes with the division. It has been found desirable to schedule the on-the-job training to coincide with the work to which the engineer is assigned. Our practice is to present this material to engineers as soon after they come in the division as possible and to motivate the engineer's interest in the course by making the programs directly applicable to problems he encounters in his work.

As far as is possible, duplication of material is avoided unless it is intentionally used for purposes of emphasis. One of the objectives of the industrial engineering division program is to develop engineers with broad plant and company knowledge and experience. In this regard, the training program emphasizes familiarization with company products, organization, and operational procedures.

Responsibility for the training of engineers is placed upon the senior engineer to whom the particular engineer reports. The organization, and preparation, and instruction of the courses in the engineering methods department of the industrial engineering division are the responsibilities of the technical advisors assigned to the several functional activities of this department.

Planning The Program

Organization of a training course in the application of package engi-

How many hours for package engineering?

In approximately six years, October, 1951, through December, 1957, a total of 7,566 engineering hours have been expended on package engineering training at the Kodak Park plant of the Eastman Kodak Company. Original preparation of text material and planning for the program covered a period of two years during which time over 1,000 engineering hours were expended. Preparation for the instruction in the course material totals 1,440 hours. A recent revision of the training manual required some 65 hours. Finally, there have been 5,000 engineering hours devoted by engineers assigned to take this course of instruction.

Additional time required for clerical preparation, necessary photography, and preparation of charts and exhibits is also a part of the total hours expended on this program. A conservative estimate of this portion of the work to the preparation, instruction, and training up to about 8,000 in the six-year would be 500 hours. This, therefore, brings the total number of hours devoted period.

neering principles to the operation at Kodak Park offered a challenging problem in two respects.

First, at the time this program was initiated in 1951, there were no formalized courses in this subject matter being offered at universities in this country.

In the second place, there was limited material in published form on numerous aspects of the package engineering problem. Considerable material was available in certain areas, specifically in relation to material properties and performance. However, subjects such as integration of the various considerations required for a well-rounded packaging program, information on how to develop and proceed on testing of packages, and information on design considerations in regard to performance under the hazards of shipping conditions were not available in any reference source. The program also had to include the correlation of varied responsibilities to achieve effective packaging of a diversified line of products.

Objectives And Content

Scope of the program was to prepare a comprehensive training course, with necessary lecture notes, exhibits, and other visual aids, to cover a complete indoctrination of new engineers (or engineers unfamiliar with the subject) in the function of package engineering in the Kodak packaging program.

Kenneth R. Marvin attended the University of Rochester, Rochester Institute of Technology, and Rochester Business Institute. Joining Eastman in 1936, his work has included time study, industrial engineering, the company's packaging committee. Mr. Marvin planned and organized Eastman's package engineering laboratory, later became supervisor of the industrial engineering division's package engineering group. Prior to attaining his current position of technical advisor, he was his division's packaging consultant.

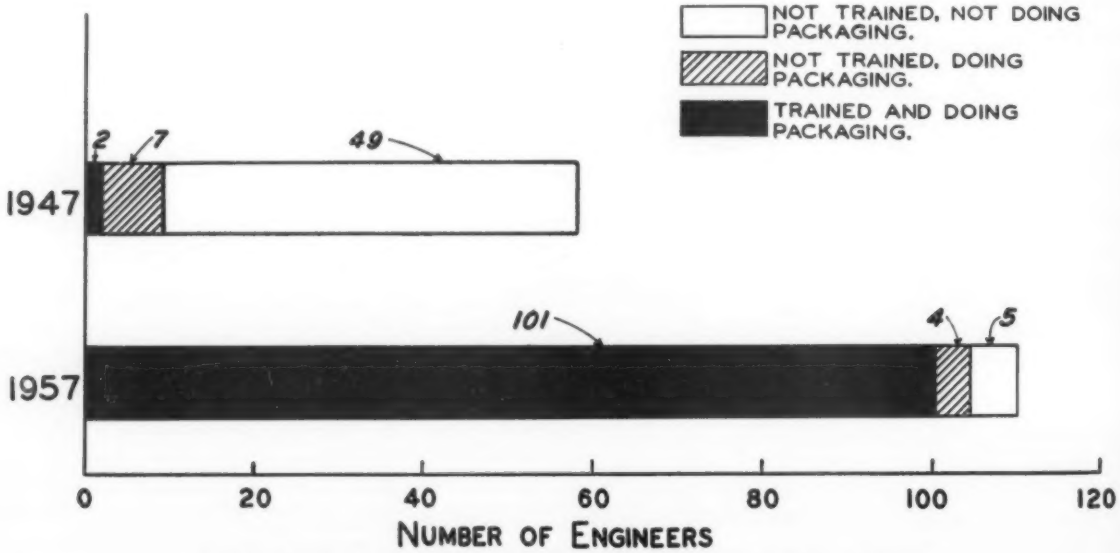
It also covered establishment of a system of scheduling engineers upon completion of the course to assignments which would permit them to receive a complete on-the-job experience in all phases of the package engineering functions.

The two-fold purpose of the training program was to (1) indoctrinate engineers in this particular function and (2) to provide a manual which could be used as a guide to the formalized training program and which would serve as a useful reference for effectively carrying out package engineering assignments.

Specifically, the original plan was to cover the following phases of package engineering by means of the instruction manual and class presentation:

1. Packaging materials.
2. Package style.
3. Package components.
4. Package functions.
5. Structural design.
6. Aesthetic design.
7. Package testing.
8. History of packaging at Kodak.
9. Responsibilities for various phases of packaging at Kodak.
10. How packages are approved.
11. Package specifications.
12. Future developments in packaging.

Most of the text material was written as original information. We made use of such reference materials as were available at that time. The manual gives credit in the form of a bibliography and reference to sources of such material.



Ten years of results in the training of engineers for packaging present graphic evidence of the program's effectiveness. Eastman industrial engineers handle all phases of an assigned problem, are not segregated by specialization.

To make the sessions as factual and current as possible, frequent use is made of actual job case histories, supplemented with the usual types of visual aids such as slides, charts, movies, exhibits, and chalk talks. It has been found helpful to plan a change of pace by frequent utilization of the various types of visual aids. Discussion of current problems is encouraged.

Supplementing the classroom activities are demonstrations in the package testing laboratory and the model shop which are operated in conjunction with the industrial engineering division's activities. In some instances, it has been found helpful to arrange for tours in various areas of the plant, such as production packaging operations, our distribution center, and our printing and box departments.

To get full group participation, we have found that 20 students per class is a workable number. The length of each class session is two hours. In a session of this duration, it has been found effective to take a five-minute break at a convenient midpoint in the class session. We use name cards for each student and the instructor.

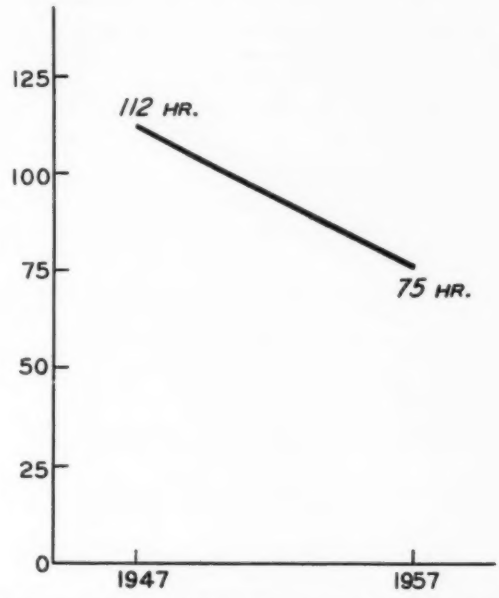
At the introductory session, each student is asked to give a brief sketch of his background with the company. This serves to acquaint individuals and also gives the instructor the opportunity of knowing a little of their backgrounds so as to be able to direct discussions and questions which will be of particular interest to each student.

Classes are planned for participation rather than straight lecture type. The success of the class depends on the ability of the instructor to obtain participation through discussions, problems, questions.

Job Of Instructor

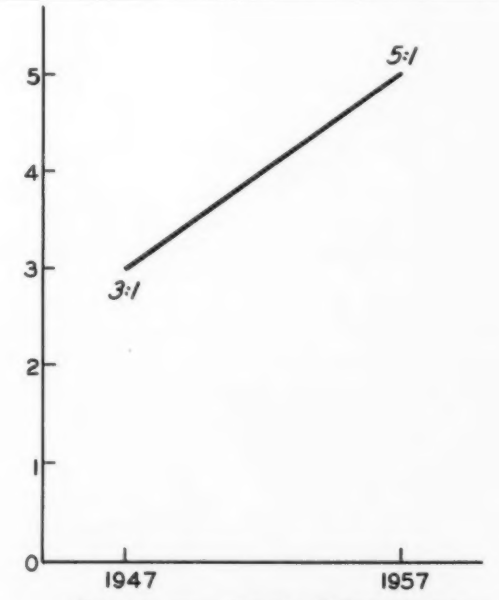
Through experience it has been found that it is more effective to have one instructor conduct the entire series of sessions rather than to have this responsibility divided among a number of instructors for each subject matter. This avoids unnecessary duplication and also insures coordination of subject matter and proper review emphasis.

We find that effective instructing will require about twice the amount of time in preparation as is actually necessary to conduct the course. This does not necessarily mean that an instructor who has conducted a number of courses can reduce his preparation time, particularly when



ENGINEERING HOURS PER ASSIGNMENT

Note how engineer hours per assignment have dropped from 112 in 1947 to 75 in 1957. Planned job-related training means better use of time on the job.



RATIO OF COST REDUCTION TO ENGINEERING COST

Effectiveness of program shows up in greatly improved ratio of cost reduction to engineering cost, as viewed over ten-year period.

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Package Engineering Manual

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Table of contents shows scope of training program. Manual serves as class text and as reference book on the job. Most of text represents original material written for this program. It stresses company policies and procedures as well as substantive engineering material.

there may be an interval of perhaps six months between classes.

Another responsibility of the instructor is to keep the material, exhibits, etc., current and this will require additional preparation time. **The instructor also assists supervision in necessary follow-up to insure that the engineer is effectively applying the principles covered.**

He not only must have a thorough knowledge of the subject matter, but should have a very firm background in knowledge of company products, policies, and organization, and must also have a knowledge of the application of the subject to general conditions. The instructor must be relaxed, friendly, but business-like. He must be alert to class attitude and attention, thereby getting participation from those who may be inclined to be less outspoken than others in the class.

One of the techniques which can be learned best by experience is that of handling questions which may or may not relate to the particular subject matter at hand. Our experience has been to answer briefly to acknowledge the student and also state that the particular question will be handled more completely at some future part of the course.

Reviewing The Results

It is our practice to review the entire course content briefly in the concluding session, then provide a period of open discussion of any point which has not been clearly understood. This is followed by a brief written quiz covering the essential content of the course. No attempt is made to grade these examinations. Before the class is dismissed, each student is asked to read his answer to one of the questions and any difference of opinion is discussed. In this way, the correct answers to all questions are known when the course is concluded.

Another tool used for evaluation of the course is a form which is passed out to the students in one of the later sessions asking for constructive criticism in regard to subject matter, ability, and technique used by instructor, and any other comments in regard to how the course could be improved.

In the past three to four years, we have had five engineers from this division who have received this training and have had extensive on-the-job experience in the field of package engineering transferred to responsible package engineering positions in other areas of the company. Two of them have gone on to other divisions as senior packaging engineers; one is now supervisor of distribution and shipping; another is currently managing the package engineering activities of the apparatus and optical division of the company, and the fifth man is responsible for package development in a major department. (*End*)

Eastman encourages school attendance

In addition to the courses within the company, a number of courses are available through outside sources such as the University of Rochester, the Rochester Institute of Technology, and in some instances, courses conducted at other educational institutions outside the city.

Company policy not only encourages people to participate in such training programs as are directly related to advancement in their particular field, but also compensates the employee who successfully completes accredited courses directed toward his improved knowledge by refunding a substantial portion of the tuition. During the academic year 1956-57, 6.5 per cent of the employees at Kodak Park completed extension courses at approved schools.

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How to locate optimum placement of cushioning for liquids in glass containers

It is often easier to answer a question than to ask it correctly. In packaging research, as in all scientific research, the most important step is to identify the problem correctly. In the case reported here, the ostensible problem was how to reduce packaging costs, but the real problem was how to find the optimum location of the cushioning for bottles containing liquids when packed in a shipping container. A secondary problem was in the interpretation of the results of tests.

By Allyn C. Beardsell,
President,
and Jerome J. Kipnees,
Assistant to the President,
Container Laboratories, Inc.
New York, N. Y.

PART I
How the real problem was identified

One of the most fascinating studies made by our organization involved an exhaustive analysis and research investigation on the packaging for twelve 4/5-quart bottles of whiskey. The objective was to develop a method of packaging that would provide a satisfactory level of protection for the contents at a lower cost than had theretofore prevailed.

Reduced to simplest terms, the project was one of determining how to locate the optimum placement or positioning of cushioning material in a case of whiskey. As so frequently occurs in packaging studies, there was no standardized method of determining the proper position—let alone to determine what was the optimum position. Therefore, we had to carry out the investigation in several stages, the first of which was to develop a *method*. After we had a method, then we were able to apply it to the problem at hand.

The investigations were carried out for a large distiller who was seeking a method of reducing the cost of his packaging. When the solution was reached, the distiller realized an enormous annual cost-saving. His new method of packaging has been extended to the entire industry with equivalent benefits to all.

Allyn C. Beardsell is a graduate of Harvard University with an A. B. degree. Prior to joining Container Laboratories in 1949, he was supervisor and director of the Eastern Division Package Laboratories of Hinde & Dauch and coordinator of packaging, shipping, and warehousing of Western Electric Company. Mr. Beardsell is a member of Packaging Institute, the container and material testing committee of American Ordnance Association, and is president and former director of the New York chapter of SIPMHE. He is a member of the cold storage research advisory committee of the Department of Agriculture and is a member of the Scientific Advisory Council of the Refrigeration Research Foundation.

Jerome J. Kipnees is a graduate of Brooklyn College with an A.B. degree. Prior to joining Container Laboratories in 1942, he was with New York University Medical College and with the Quartermaster Corps Climatic Research Laboratory. A member of Packaging Institute, he is chairman of its corrugated and solid fibre shipping container committee and is a member of its paper committee. He is a member of ASTM, on Committees D-6 and D-10 and is a member of the container testing committee of TAPPI. Mr. Kipnees has been a packaging instructor and lecturer at New York University and Rutgers University.

Analyze, Compare, Choose

The following plan of approach to the study of the problem was adopted:

1. **Conduct a thorough analysis** of current methods of packaging used by the distiller for his twelve 4/5-qt. bottles in order to develop existing performance and basic cost indices. This included the formulation of a testing program to establish reliable data, for it was necessary to know present costs before it would be possible to know whether any changes would result in lowered costs.

2. **Analyze the performance** and cost of alternate methods of packaging. Also, determine the validity of the findings regarding the significant properties of the packaging and satisfactory methods of measurement.

3. **Integrate the results** of these analyses to select the variety or varieties

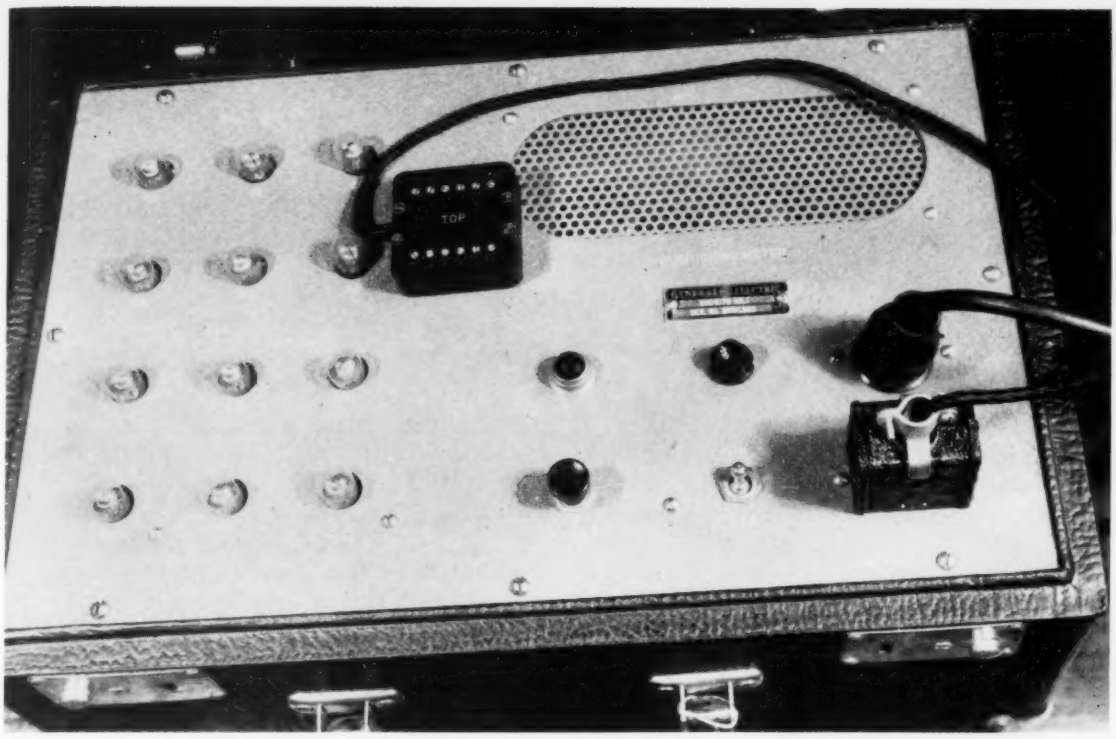


Fig. 1 General Electric cushioning meter showing the detector head lying on the indicator board which carries 15 electric lamps calibrated in G's.

of all those tested which offered the greatest advantages.

Four Ways To Package

Initially, four methods of packaging, identified as Codes A, B, C, and D respectively, were investigated. Code A represented the standard packaging specification of the distiller. D represented an alternate specification. B represented a still less common alternate. C represented a proposed shipping container that had not been used and was not permissible for rail shipment under the then existing rule of the Consolidated Freight Classification. The following tabulations describe the containers:

Code description	Gross weight, average, lb.	Brief description
Code A	34-3/4	Double-wall box; single-wall test* partitions
Code B	35-1/4	Single-wall box; single-wall test* partition, liner & pads
Code C	34-1/2	Single-wall box; single-wall test* partitions
Code D	34-1/4	Single-wall box; single-wall non-test* partitions, liner & pads

*Test means a specified bursting strength; non-test or no-test means absence of a specification for bursting strength.

For all four methods of packaging, the contents consisted of twelve 4/5-qt. glass whiskey bottles filled with water to the normal level. The bottles were closed with metal screw caps and fitted with cellulose neck bands. The bottles were arranged in one layer, four along the length of the box and three along the width. All packaging materials and bottles used in the testing program were new. In addition, all materials were subjected to standard conditioning at least 24 hours prior to testing.

Incline Impact Test

This test simulates the stresses applied to merchandise in a carrier, such as a freight car or a truck, when the vehicle is subjected to sudden starts or stops. Boxes were subjected to successive impacts until breakage occurred (when the test was stopped): 10 from a distance 1 ft. up the incline; 10 from 2 ft. up the incline; 10 from 3 ft., etc.

At failure, the number of foot-falls —i.e., the summation of the product of the distance in feet up the incline multiplied by the number of releases from that distance—was recorded, as well as the position of the broken bottle or bottles in the cells. For example, if a box sustained 10 impacts from 1 ft. up the incline, 10 impacts from 2 ft. up the incline and 3 impacts from 3 ft. up the incline before bottle breakage was sustained, the foot-falls to breakage would be:

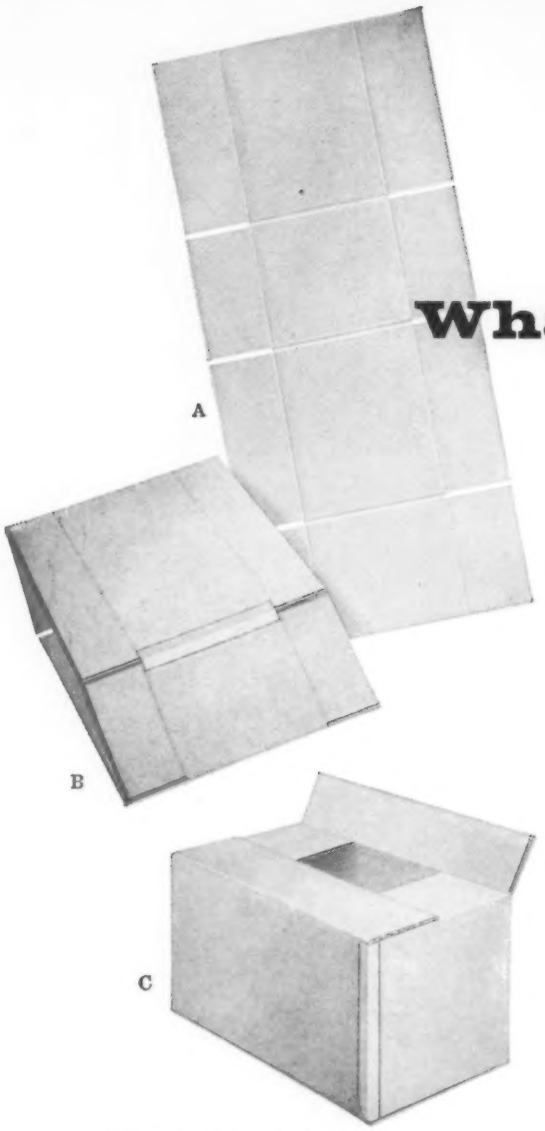
$$\text{Foot-falls} = (10 \times 1) + (10 \times 2) + (3 \times 3) = 39$$

Cushioning Tests

This test is based on the principle that, for most packaged objects subjected to arrested motion, such as in an incline impact test, **the maximum value of rate of change of the velocity (maximum deceleration) with which the object comes to rest after the outer box has struck the obstacle is a good measure of the shock to which the object is subjected.** The instrument used in this study to measure the deceleration was a General Electric cushioning meter or "G"-meter, consisting of an indi-

What you should know about

What should a box

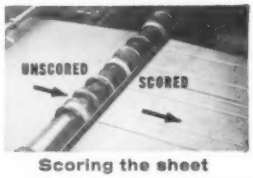


A. Scored and slotted sheet
B. Folded and taped
C. Assembled box

The "creases", or scores, on corrugated boxes facilitate folding. When straight, and properly formed, they make your packing job easier and faster, assure maximum strength and serviceability of the box.

But just being straight isn't enough. Too narrow or too shallow a score sets up internal stresses, makes the box hard to fold. Too deep, weakens the board, makes the fold easy to tear and come apart during shipment.

What makes a perfect score?



Scoring the sheet

It depends largely on the thickness and type of board, the scoring process, what you are shipping, and how it is shipped. First, the score must fold without cracking the board. It must also fold straight, regardless of the direction of the corrugations. It must not cramp the inner liners too much when folded at 180°. And it must, under test, withstand

For more information circle No. 224 on Reader Service Card

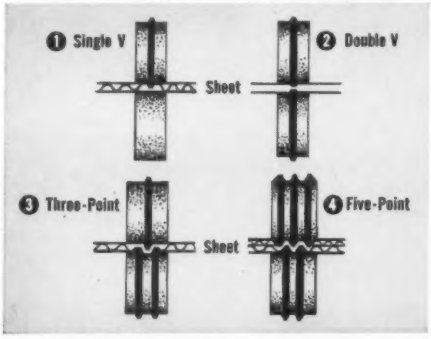
scoring and slotting of Union Boxes

"crease" be...besides straight?

combined tearing, bending and tension forces simulating those it will meet in actual service.

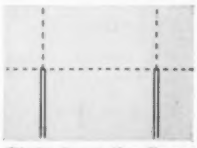
The different kinds of scores

There are four basic methods of scoring corrugated board. 1. The "Single V" crease—most commonly used when the direction of the score is parallel to the corrugations. 2. The "Double V"—generally used *across* the corrugations and where a clean, good-looking fold is essential. 3. The "Three-Point" crease — good both "with" and "across" corrugations. Used where high tearing strength is paramount. And 4., the "Five-Point" crease. This, too, scores both ways. It is used almost exclusively for double wall board.



The importance of slotting

Slots, cut by razor-sharp knives, form the top and bottom flaps of your corrugated box. Each slot must cut to an exact width, and at right angles to the flap scores so that the folded flaps will be perfectly parallel where they come together. The knives must cut a clean slot, without ragged edges or "lint". Improper slotting can seriously impair the appearance and protective qualities of your finished box.


Slots form the flaps

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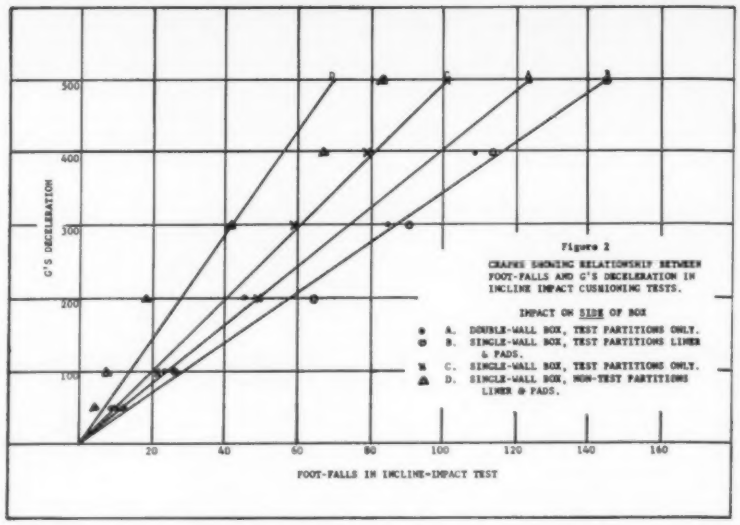

Fig. 2 Graphs showing the relationship between foot-falls and G's of deceleration from data obtained in incline-impact tests of the cushioning when impact is on side of box.

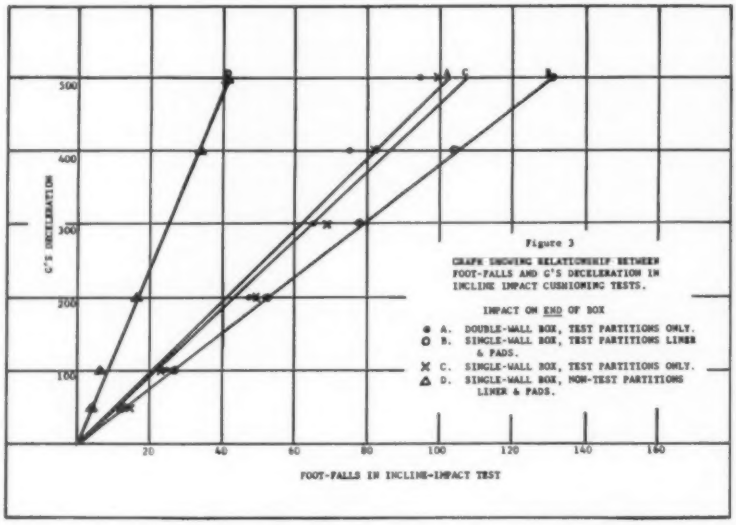

Fig. 3 Graphs showing the relationship between foot-falls and G's of deceleration from data obtained in incline-impact tests of the cushioning when impact is on end of box.

cator and a detector head that is connected to the indicator by a flexible cable. (Fig. 1)

At each shock the detector head responds to the maximum value of deceleration reached by the object or dummy, and actuates an electronic circuit that causes appropriate lamps to glow on the indicator. The lamps are calibrated directly in G's, one G being the acceleration of a falling body (32.2 ft. per sec. per sec.). Twenty-eight boxes of each group were tested individually on the incline impact tester, using wooden dummy bottles and the General Electric cushioning meter.

Incline impact tests were then made in the same manner as previously described for the glass bottles except that the shock in G's was recorded after each impact. The test was run until a shock of 500 G's—the maximum capacity of the detector head—had been sustained.

Revolving Drum Tests

The revolving drum test subjects the container undergoing test to treatment closely simulating handling during transportation. The machine used in this test is a 7-ft. hexagonal drum resembling a large barrel placed on its bilge. On the inside faces of the drum is arranged a series of baffles which cause the container undergoing test to fall on

its various parts in succession as the drum revolves at a constant rate of 2 revolutions per minute. The number of falls which a container can withstand in the drum before failure of the contents (or the container) is a measure of its serviceability.

Ten loaded boxes from each of the four groups were tested individually in the revolving drum. The number of falls required to produce bottle breakage, and the cell-position of the broken bottle was recorded.

Drop Tests

Five loaded boxes were tested individually with a divided table-top drop tester. All drops were made from a height of 2 ft. in such a manner that the box struck diagonally on a corner. Successive drops were made on different corners in accordance with a standard sequence as prescribed in the test procedures, either PI Shipping Containers 4t - 53[1] from Packaging Institute or ASTM D 775 - 47[2] from American Society for Testing Materials, until all eight corners had been tested, whereupon the cycle was repeated.

Tests were run until the bottles spilled out of the container, or until one or more bottles was broken, whichever occurred first. The number of drops to box failure or to bottle breakage was recorded, along with the cell-position of broken bottles.

Compression Tests

The compression test subjects the containers to compressive forces similar to those to which they would be subjected while in transit or when stored in warehouses. Each container is tested individually in the compression machine which consists of a platform scale over which a power-driven cross-beam is mounted.

Fifteen boxes of each group, sealed empty but fitted with interior packing, were subjected to top-to-bottom compression, end-to-end compression, and side-to-side compression. In addition, bursting, puncture, and flat-crush tests were made on the boxes of each group and on the interior packing pieces.

Test Data

For simplicity of presentation, the test results are summarized in Tables I and II and in graphic form in Figs. 2 and 3.

Comments On Data

Discussion of the data is divid-

1. This testing procedure is obtainable from Packaging Institute, 342 Madison Ave., New York 17, N.Y.
2. This testing procedure is obtainable from American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.
(These procedures are identical except for the additional explanatory matter in the PI procedure.)

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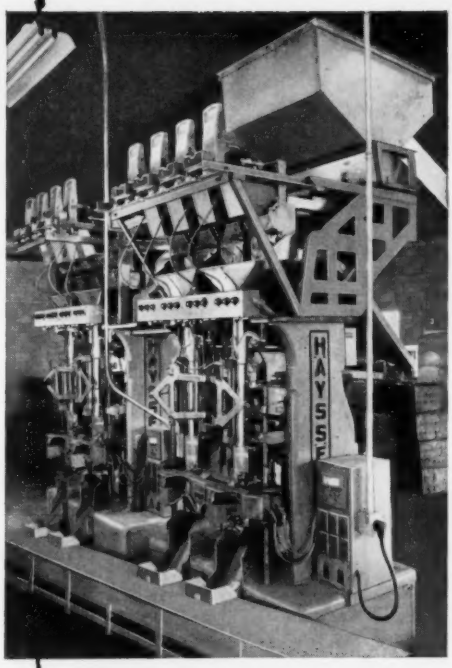

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ed into two parts: The first part dealing with the actual test results of the initial investigation; the second part dealing with the conclusions that can be drawn from them.

The bursting (Mullen) tests summarized in Table I (tests on combined board) indicate that the single-wall board used in the boxes of Codes B and C was far below the certificate requirement of 200 lb/sq. in. The same type of board was used in the test partitions and gave results that, while somewhat higher, were still below 200 lb/sq. in. The non-test material had a very low bursting strength.

With the exception of the double-wall boxes and the test partition pieces, the puncture test averages of all samples were quite similar to the corresponding bursting test averages. The double-wall boxes had a very high puncture resistance in comparison with all the other material. And, conversely, the 3-part test partition pieces had the lowest puncture resistance of all but the non-test materials.

What flat-crush results showed. Since flat-crush resistance is a function of the type and flute of a corrugating material, the shape and formation of the corrugations, and the strength of the bond, it is difficult to establish precise standards. Nevertheless, the expectancy for a well-fabricated A-flute single-wall board was 22 lb/sq. in. at the time the study was conducted. (As a result of a general improvement in fibreboard throughout the years, the comparable A-flute figure is now 25 lb. per sq. in.).

Using the figure of 22 lb/sq. in. as the criterion, the single-wall A-flute board, used in the boxes of Codes B and C and in the 200-lb. test pads and liners, rated fair to good. The same type of board used for the partition pieces, on the other hand, was deficient in this strength characteristic. Flat-crush results on the various items of non-test interior packing were consistently lower than on the corresponding 200-lb. test pieces.

The average on the single-wall board used in the boxes of Code D indicated the lowest flat-crush resistance on the various shipping containers. The double-wall board used in boxes of Code A had an extremely variable flat-crush resistance.

Compression test findings. In general, the compression-test results on Code A (double-wall box with test partitions only) and on

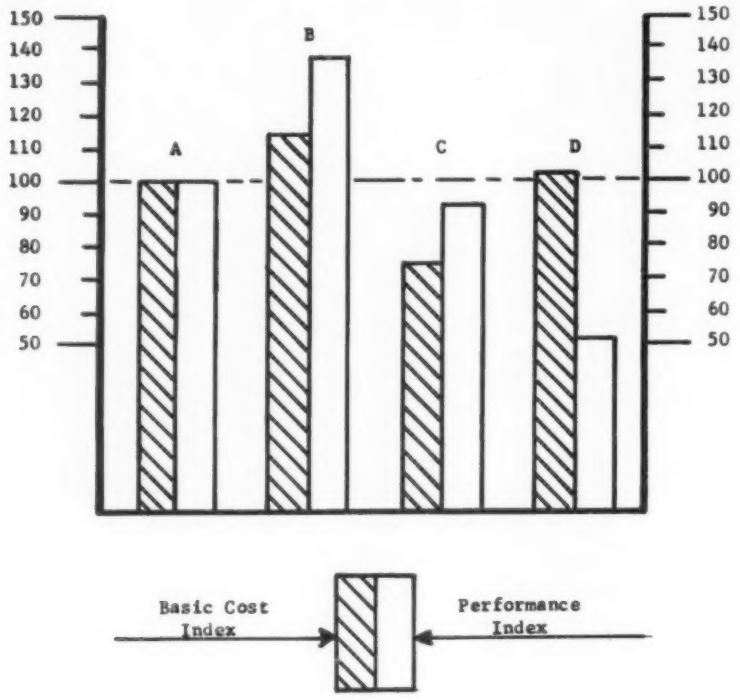


Figure 4

Comparison of Codes A, B, C and D (Code A considered 100%)

Fig. 4 Comparing cost and performance of packaging by Codes A, B, C, and D. In this graphic presentation, Code A (the original packaging) is considered as 100 per cent for both cost and performance.

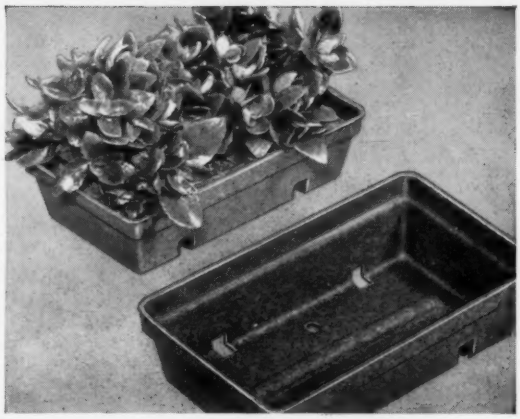
TABLE I

Tests on Combined Board

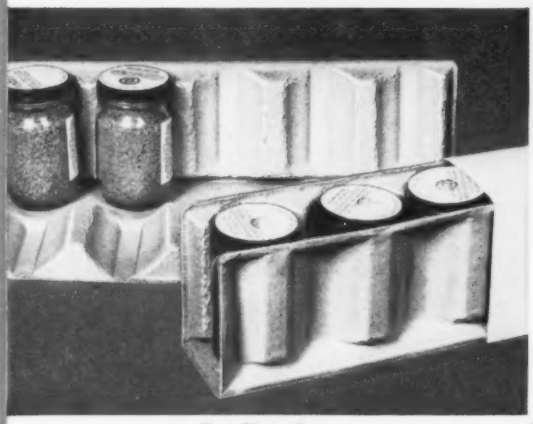
BOXES:	Bursting Tests (lb/sq.in.)	Puncture Tests (puncture units)	Flat-Crush Tests (lb/sq.in.)
Code A (200-lb. Double-Wall; A-B Flute)	207	335	21.8*
Code B (200-lb. Single Wall; A-Flute)	160	175	19.1
Code C (200-lb. Single-Wall; A-Flute)	157	158	20.6
Code D (200-lb. Single-Wall; A-Flute)	203	214	17.6
LINERS:			
200-lb. Single-Wall; A-Flute	168	168	20.9
Non-Test Single-Wall; A-Flute	36	33	12.4
PADS:			
200-lb. Single-Wall; A-Flute	172	188	22.6
Non-Test Single-Wall; A-Flute	39	32	12.1
PARTITIONS:			
2-part:			
200-lb. Single-Wall; A-Flute	191	157	14.3
Non-Test Single-Wall; A-Flute	38	34	12.0
3-part:			
200-lb. Single-Wall; A-Flute	173	139	17.0
Non-Test Single-Wall; A-Flute	42	32	13.4

* Flutes collapsed simultaneously.

For Fruits



For Plants



For Glass Jars

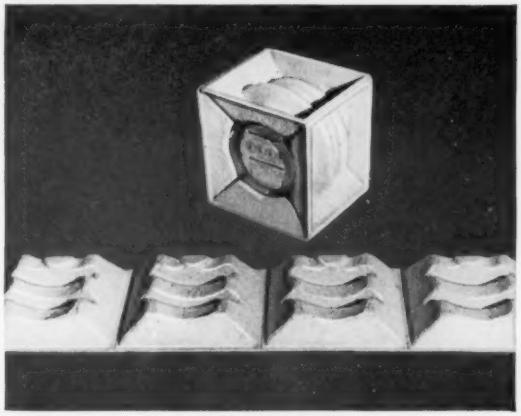


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TABLE II
Tests on Boxes

	Code A: 200-lb. Double-Wall; Test Partitions only	Code B: 200-lb. Single-Wall; Test Partitions, Pads & Liner	Code C: 200-lb. Single-Wall; Test Partitions only	Code D: 200-lb. Single-Wall; Non-Test Partitions, Pads & Liner
COMPRESSION TESTS (Load in lb.)				
Top-to-Bottom:				
Avg. load at ½-in. deflection	974	948	671	338
Avg. load at ¾-in. deflection	1134	1238	955	359
Avg. Maximum load sustained	1291	2051	1255	519
Avg. deflection at maximum (in.)	1.46	1.38	1.16	1.16
End-to-End:				
Avg. load at ½-in. deflection	747	773	518	386
Avg. maximum load sustained	921	1042	542	386
Avg. deflection at maximum (in.)	0.74	0.68	0.56	0.42
Side-to-Side:				
Avg. load at ½-in. deflection	816	784	650	461
Avg. maximum load sustained	1031	962	650	581
Avg. deflection at maximum (in.)	1.32	0.76	0.46	0.86
REVOLVING DRUM TESTS				
Avg. no. falls to bottle breakage	35	49	29	15
INCLINE-IMPACT TESTS				
Impact on end panel:				
Avg. no. foot-falls to bottle breakage	83	147	92	48
(Diagram shows number of bottles broken in each cell position)	1401 0100 0401	0341 0000 1100	0133 0000 0122	1112 0201 0102
Impact on side panel:				
Avg. no. foot-falls to bottle breakage	116	137	107	56
(Diagram showns total number of bottles broken in each cell position)	241 000 010 110	060 010 001 120	231 101 100 010	021 120 201 020
DROP TESTS				
Diagonal Corner Drops from 2-ft. height:				
Avg. number of drops to failure	10	8	5	5
Typical Failure	No breakage of bottles except after they fell out of boxes			Bottle-breakage within boxes

Code B (single-wall box with test partitions, liner and pads) were quite similar. The only major difference was in the average maximum load sustained in the top-to-bottom compression, where Code B was the higher. Code C (single-wall box with test partitions only) was less rigid than the preceding groups, and Code D (single-wall box with non-test partitions, liner and pads) had the lowest compression resistance. (See Table II).

Order of superiority in the revolving drum test, with the best group listed first, was:

Code B (single-wall box with test partitions, liner and pads.)

Code A (double-wall box with test partitions only)

Code C (single-wall box with test partitions only)

Code D (single-wall box with non-test partitions, liner and pads)

For this particular series of tests a rough criterion for adequate protection to the contents was considered to be 30 falls before bottle breakage. On this basis, Code D was inadequate, Code B provided an unusually high margin of safety, and Codes A and C were relatively close to the norm. Although records were kept and are furnished concerning the cell-position of the bottles that were broken, there was no significant finding that could be drawn from the breakage pattern.

Incline impact results parallel the drum results quite closely, the major difference being that Codes A and C were exactly on a par when the end-impact and side-impact figures were averaged. The breakage patterns were very informative—more so when Code D was disregarded.

When impact was on the end panel, only one bottle in all the boxes tested was broken in the center row of the three that were perpendicular to the backstop; when the four rows parallel to the backstop are considered, bottle breakage was greatest in the third row from the backstop.

When impact was on the side panel, the two middle rows of the four that were perpendicular to the backstop sustained far less breakage than the other rows; in the other direction breakage was greatest in the middle row of the three parallel to the backstop and at least in the row directly adjacent to the backstop.

Review Cushioning Tests

Table III summarizes the cushioning test data, supplementing the graphs presented. The table indicates again that Code D, with its non-test interior packing, provided the least protection to the contents and Code B (single-wall box with test partitions, liner and pads) provided the greatest protection. Code A (double-wall box with test partitions only) and Code C (single-wall box with test partitions only) were between these two extremes, with Code A the better of the two.

Cushioning tests are less accurate in determining the particular cell-positions that are most vulnerable from the standpoint of bottle breakage. For this type of analysis, it must be borne in mind that the fewer foot-falls required to reach an impact reading of 500 G's, the less protection is provided to the contents. On this basis, the cushioning tests indicated that, when impact was on the end-panel, the second row from the backstop of the four rows parallel thereto would have the most bottle breakage.

From incline impact tests using glass bottles, however, it was learned that the third row from the backstop was the most vulnerable! This discrepancy may be due to the fact that the hydrodynamic action of liquids in bottles

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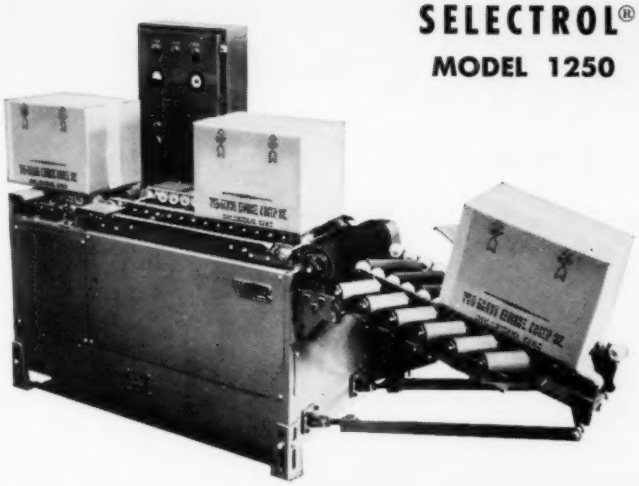

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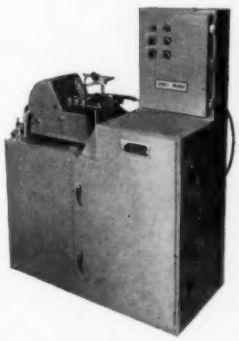

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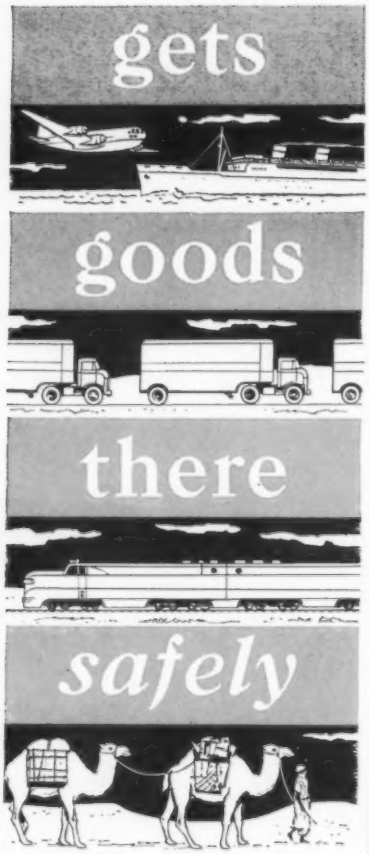

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TABLE III

The following table shows the average number of foot-falls that took place before an impact shock of 500 G's was recorded on the G-Meter. Figures give the data for each cell position. The cell positions are oriented with reference to the backstop of the Incline-Impact Tester, represented in each diagram by the right-hand vertical line.

Figures below each diagram indicate the average number of foot-falls for the box as a whole. These figures also take into consideration the untested cell positions, the figures for which were computed by analogy.

Code A: Double-Wall Box; Test Partitions only	Code B: Single-Wall Box; Test Partitions, Liner & Pads	Code C: Single-Wall Box; Test Partitions only	Code D: Single-Wall Box; Non-Test Partitions, Liner & Pads
End Panel of Box Striking the Backstop			
177 69 33 86 160 63 20 133	450 84 69 76 226 103 31 101	169 121 55 74 185 96 38 57	113 28 23 30 94 15 13 27
Avg.: 93	133	98	41
Side Panel of Box Striking Backstop			
304 74 113 160 42 44	358 56 116 189 85 58	193 89 108 131 38 39	143 15 64 234 21 15
Avg.: 123	144	100	82

produces effects which cannot be duplicated by using dummy wooden bottles despite the similarity of dimensions, weight and center of gravity.

Cushioning results are also presented in two graphs (Figs. 2 and 3) one for impact against the end-panel and one for impact against the side panel. Each is a composite picture for all cell-positions tested, and illustrates anew that Code B provided the greatest protection, Codes A and C the next greatest protection, and Code D the least protection.

Drop tests show a relationship of the groups different from that in any other test, but the explanation lies in the nature of the failure. In Code D, failure always took the form of bottle breakage within the box—a direct result of the poor protective qualities of a non-test interior packing. With other groups, box failure, i.e., rupture of one or more scores, always occurred first, and this permitted the bottles to fall onto the base of the drop tester. Bottle breakage in these groups, therefore, was only incidental and did not have the same significance as in Code D containers.

With respect to the three codes using 200-lb. test interior packing, **Code A was best** because the double-wall boxboard sustained more drops before the scores ruptured. **Code B was next best** because the liner not only retarded score rupture but also acted as a physical barrier to prevent the bottles from falling out.

Some Conclusions Drawn

Bursting, puncture, and flat-crush tests provide necessary and desirable information on the various elements of the package, individually, *but not collectively*. To find the latter, reference must be made to the test on the boxes with their respective interior packings.

Although bottles have great top-to-bottom load-bearing capacity, compressive resistance is important, nevertheless, because the containers are subjected to thrusts on the side and end panels as well. Moreover, if the boxes buckle because they cannot withstand certain compressive forces, the cushioning properties of the container are seriously reduced. In evaluating compression test results, it must be borne in mind that the fit of the interior packing with respect

to the various container surfaces has a profound effect. If this fit is too loose, as it was in many of the cases, the interior packing provides little or none of the supplementary support that it normally should provide.

Significance of the drop test lies in the fact that the non-test interior packing was inadequate, whereas the 200-lb. test interior packing—even when consisting only of partitions in a single-wall box—was satisfactory. Since, in the normal handling of liquor cases, it is unusual for the boxes to be subjected to drops as severe as those involved in the laboratory tests (from a height of 2 feet onto a corner of the box) Code C was satisfactory even though it had the lowest number of drops to failure of the three codes with test interior packing.

The general similarity of drum test results and incline impact results was striking. The latter test was particularly important since it provides shocks which simulate very closely those produced in a freight car when it starts, stops, or is shunted back and forth.

Watch Container Dimensions

Before the overall results of the four methods of packaging are evaluated, it is pertinent to emphasize the point that incorrect dimensions of the containers and interior packing can radically alter the protective qualities of the package as a whole. In general, it is desirable to provide a fit as snug as possible consistent with the ease of packing and unpacking, and protection of the label against scuffing.

For the specific commodity involved in this study, the rigidity and crushing resistance provided by the non-test interior packing was wholly inadequate. The particular type of non-test board submitted and tested was of a rather low quality, as indicated by the flat crush test results on the combined board.

Code B (single-wall box with test partitions, liner and pads) pro-

Labeling Lines

by George L. N. Meyer, Jr.

LABELING ADHESIVES

To obtain engineered performance from a labeling machine, it is imperative to use an adhesive formulated to operate cleanly and efficiently in the machine. In this article let's analyze some of the conditions which must be recognized in order to obtain first class labeling.

The majority of labeling adhesives for high speed machine application fall under four main classes: (1) Dextrins, (2) Jelly Gums, (3) Animal Glues, and (4) Caseins. The basic characteristics of each type, the effect of moisture and humidity on the dried film and the final adhesion properties must be considered.

DEXTRINS: The dextrin labeling glues are usually brown in color, are on the acid side and have a fluid or semi-fluid body. Very high in solids, they "machine" well and are fast drying. They have good transfer and stencilling properties. However, they have no water resistance and can't qualify as iceproof or semi-iceproof gums.

JELLY GUMS: Jelly gums are colloidal dispersions of starch. They are rubbery and cohesive, ranging from dark reddish-brown to white in color. Generally they are alkaline. However, some are referred to as neutral gums and are actually slightly acid. They provide excellent resistance to high humidity, and offer limited resistance to water immersion when used on ordinary paper labels. However, when foil labels are used, the foil acts as a barrier to prevent water from getting into the glue line thus providing longer water resistance. Jelly gums are effective on hot, cold, wet, dry, greasy or oily bottles. They are effective on flint, opal, borosilicate and most scratch resistant glasses (but not silicone treated). Jelly gums are standard recommendations in the distilling, food and soft drink industries, and are widely used in the drug, pharmaceutical and cosmetic industries.

ANIMAL GLUES: These products are made from a liquefied animal glue base with other ingredients to assure clean operation. Usually medium brown in color, they are slightly on the acid side and have a fluid or semi-pasty body. They provide good tack and a moderately fast setting and drying rate. They are used primarily as iceproof gums in the brewing and soft drink industries since they provide good immersion resistance in ice water. However, the use of animal glues has diminished in the past decade due to the superior water resistance of casein labeling adhesives.

CASEINS: Properly formulated, casein labeling adhesives consist of a casein base treated with chemicals and film formers which give flow, shortness, excellent machineability and superior water resistance. The pigmented types are off-white in color, while the unpigmented caseins range from amber to dark brown. They usually have a fluid or semi-pasty body and are slightly alkaline. Breweries prefer their peculiar type of tack which does not appear as strong as the tack of other types when checked by the finger test, but holds down the edges of the labels very effectively. Most caseins must be applied in thin films in order to be fast setting. High humidity resistance is obtained. The superior water resistance is recognized by breweries. Since casein adhesives are not readily dilutable with water, ammonia or other special diluents are required. Caseins are excellent for final adhesion at low humidity. Government labeling under Specification UM 186, which requires 48 hours water immersion at 75 ± 5° F, can be accomplished with the proper casein adhesives. However, production should be checked frequently for conformance. Greater water resistance can be obtained if alcohol is used as the diluent.

There are new treatments which provide scratch resistance and help to assure less breakage. Fortunately many such treatments do not involve the use of silicone and thus may be adhered with conventional adhesives. However, it is advisable to submit samples of any specially treated glass to your adhesive supplier for his recommendation before commencing production labeling.

Unfortunately no one has developed, as yet, an all purpose labeling adhesive. Careful evaluation of equipment, materials to be labeled and end use requirements should be weighed, and the final selection of the proper adhesive made, after all factors have been evaluated.

COVERAGE: Coverage may be expressed in a number of ways but dilution, film thickness, machine adjustment and other factors create variations. Generally speaking, casein adhesives provide the greatest coverage primarily because of their superior machining characteristics which permit the application of the thinnest film of adhesive. It is not unusual to label 1½ million soft drink bottles, front and neck with one drum (approximately 500 lbs.) of casein type adhesive. Jelly gum types will generally provide about ⅗ as much coverage and dextrin types about ½ the coverage of the casein types.

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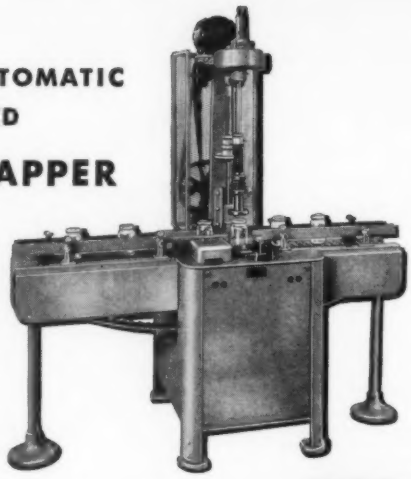

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vided the best protection to the contents. But, as indicated particularly by the drum test-results, the degree of protection appeared to be considerably greater than that usually required to withstand the normal hazards of shipment. **It would seem, therefore, that the method represented by Code B was overpackaging the product and might well be economically unsound.**

The remaining codes both had interior packing consisting solely of test partitions. Code C had a single-wall outer container and, while this provided less overall protection than Code A with a double-wall box, the difference was not too great and was negligible in the incline impact test. Since comparison of the drum test results, of 29 falls to breakage with the rough criterion of 30 falls, indicates that the method of packaging represented by this group just about provided the minimum protection necessary and, since a single-wall box is cheaper than a double-wall box, **Code C can be regarded as potentially the most efficient method.**

The findings of the initial study were then transmitted to the distiller for his consideration.

After a thorough study of the test data, a further research study was conducted. This study involved an investigation of the various modifications of the Code-C packaging, modifications with respect to material, flute, and direction of corrugations, and resulted in extremely interesting conclusions. Many of the evaluation techniques employed in the initial study were employed in the larger, subsequent evaluation. The second study will be presented in the second article in this series.

In conclusion, the ultimate findings of the initial study are graphically represented in Fig. 4 which compares the basic cost index and performance index of the four methods of package evaluation.

(Editor's note: Part II of this article will appear in our November issue, and Part III in December.)

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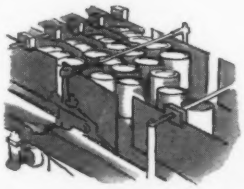
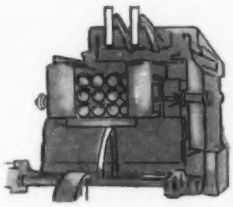
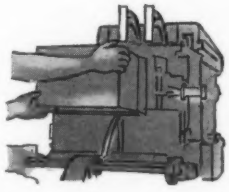
4 Steps to PROFIT in Casing Canned Oil



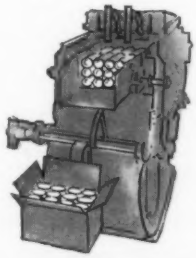
Efficient gathering cycle.
Cans enter machine upright through 90° twister, with no rolling or bead-to-body impact. They move smoothly along woven wire belt into divider lanes.



Fast and automatic operation.
When all lanes are filled, pressure activates pick-up arms which place cans in loading funnel. A second set of arms repeats this action for two-tier loading.



1200 cases an hour!
Operator places empty case over funnel. Bottom flap trips switch, starting case-loading cycle. Lowerator arm rises automatically to support case. Pusher arms load cans into case, moving case onto lowerator arm.



Continuous, flexible operation.
Hydraulically controlled lowerator eases filled case to horizontal position for take-away in any direction. Cycle is repeated when operator places next empty case on funnel.

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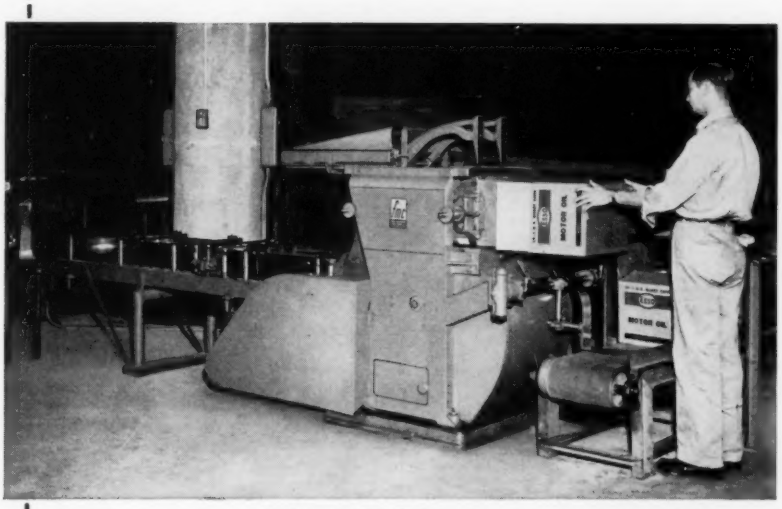

FMC "Non-Shock" Caser shown casing quart cans at the Louisville, Kentucky plant of Standard Oil Company (Kentucky).

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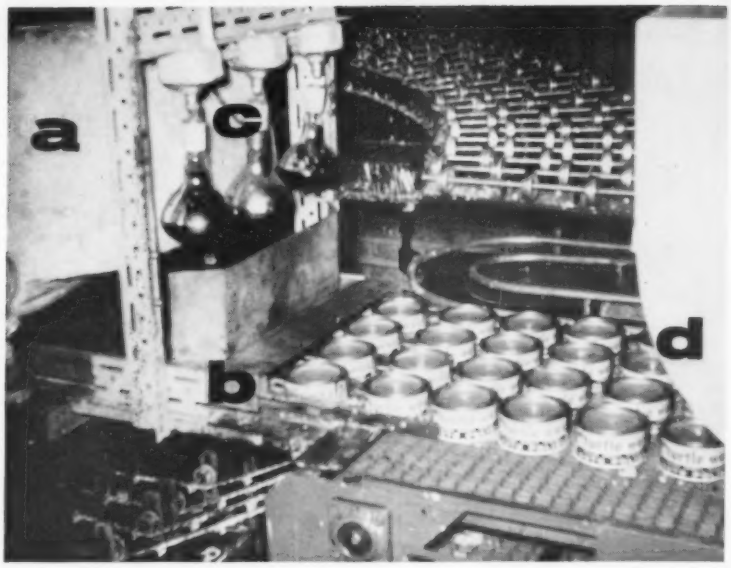


Fig. 1. After cans are filled with paste wax by filler (a), they travel through "hot" tunnel (b), the top of which is heated by three heat lamps (c). This prevents top surface of wax from chilling and hardening so quickly as to trap air within product. As cans are discharged from this tunnel, they travel about 26 in., during which time any air present passes out of product. They then enter cooling tunnel (d).

Cooling tunnel makes year-around paste-wax packaging practical

By Joseph Petrancosta,
Superintendent,
Turtle Wax-Plastone Company,
Chicago

Packaging of a product such as paste wax must be done under certain ideal conditions in order to have a smooth, high-quality product. The secret here is the rate of cooling the product after it has been filled and the temperature to which it is cooled. How to accomplish this consistently on a year-around basis is explained by Mr. Petrancosta as he describes the mechanically refrigerated cooling tunnel which the personnel of the company built and installed in limited floor area and at minimum cost.

Through use of a mechanically refrigerated cooling tunnel 50 ft. in length, we are able to package our paste wax on a year-around basis. This equipment assures us a consistently good, even-textured, high-quality product.

Due to the nature of this product, it must be filled under certain ideal conditions – the main ones being the cooling temperature range and the control of the rate of cooling before closing the container. Too rapid cooling can cause cracking and crumbling. Other problems which faced us when we were first planning our line were: (1) How to maintain minimum inventories of raw materials, packaging supplies, and finished product; (2) how to install such a line with minimum capital investment, and (3) how to install it in a limited amount of floor space.

Floor space limited. When we first experimented with paste wax, all of our packaging equipment was geared to handle liquids. Also, we had only enough floor space to allow installing a cooling conveyor 50 ft. in length. Our laboratory established that the product had to be filled at a temperature of 138°F. and cooled to approximately 94°F. at a rate of 2.2°F/min. With these conditions of filling and the physical layout of our plant, we in production had to set up a line with a minimum amount of expenditure.

Filling Equipment Rebuilt

We first insulated the hopper and nozzles of an Elgin 4-head filler to maintain an even product temperature throughout the filling cycle. To insure further the prop-

er temperature of the wax during filling, we equipped the hopper with strip heaters and thermostats. A small, portable, slow-speed agitator was installed on the top edge of the hopper to aid in maintaining an even temperature and to eliminate possible aeration and congealing of the product. All heat controls are located conveniently for the filling machine operator.

The speed of the filler had to be reduced to conform to the rate at which the cans had to be cooled. With the fabrication and installation of new guide rails to handle the larger diameter cans, our filling equipment was complete.

Use Heat Lamps

Immediately after the filling spouts, we installed a shallow, galvanized tin "hot" tunnel 24 in. long, the top of which is 1/2 in. from the tops of the cans. This tunnel is heated by means of three heat lamps, Fig. 1, whose hot surfaces are about 8 in. from, and directed on, the top of the tunnel.

The purpose of this short tunnel is to prevent the top surface of the wax from chilling and hardening so quickly as to trap air within — which, if it happened, would defeat our goal to obtain a smooth, glossy, top wax finish. As the cans are discharged from this tunnel, and before they enter the cooling conveyor, they travel a distance of about 26 in., during which time any air present passes out of the product.

Idle equipment used. To carry a discharge of four cans abreast, a conveyor 20 in. wide was required. From one of our previous promotional packaging operations we had in stock a conveyor 20 ft. long and 24 in. wide which was ideal. To obtain the required 50 ft., we purchased additional chain; also, we ordered the necessary reduction gear, sprockets, and angle iron. This purchase turned out to be our major expenditure on the construction at that time.

Prior to our present set-up with the refrigerated cooling tunnel, we cooled the hot wax with eight 20-

Joseph Petrancosta has been associated with the Turtle Wax-Plastone Company since 1946. His training and education in production and packaging have been self-developed from practical experience accumulated with the growth of the company. Prior to 1946, he was self-employed.

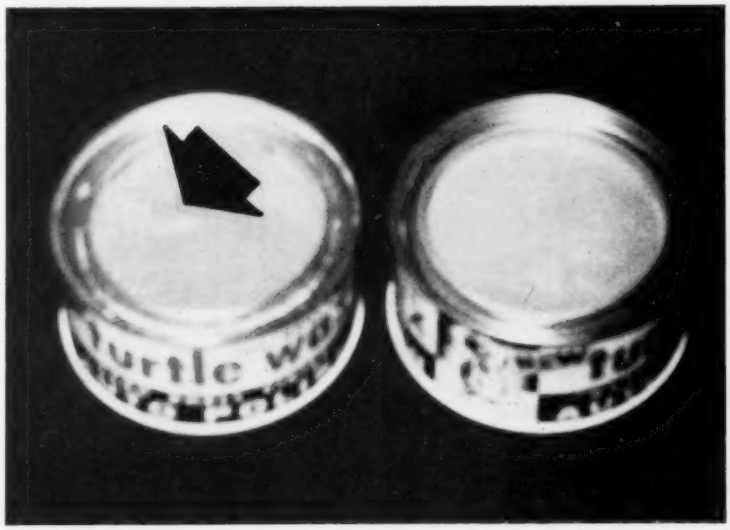


Fig. 2. Surface of product in left can is wavy and has bubble (arrow) which was caused by vibration of cooling conveyor. In right can, it is smooth and free of bubbles which is result of vibration-free conveyor.

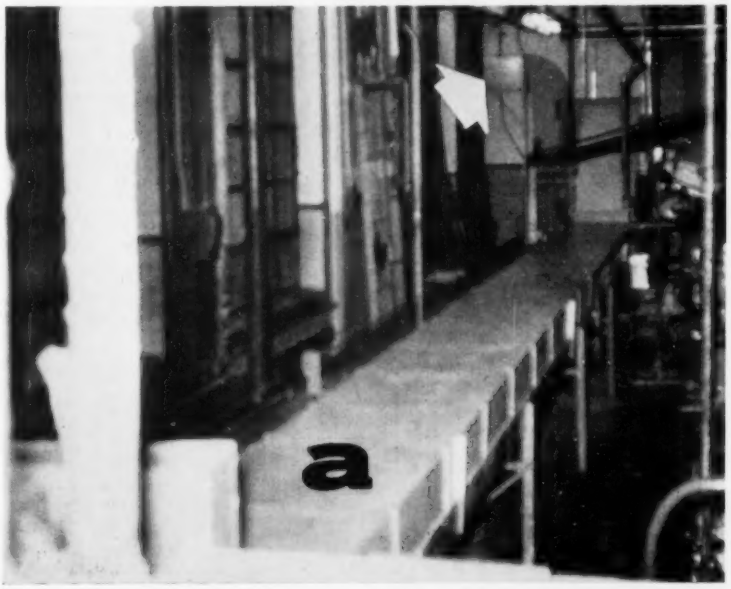
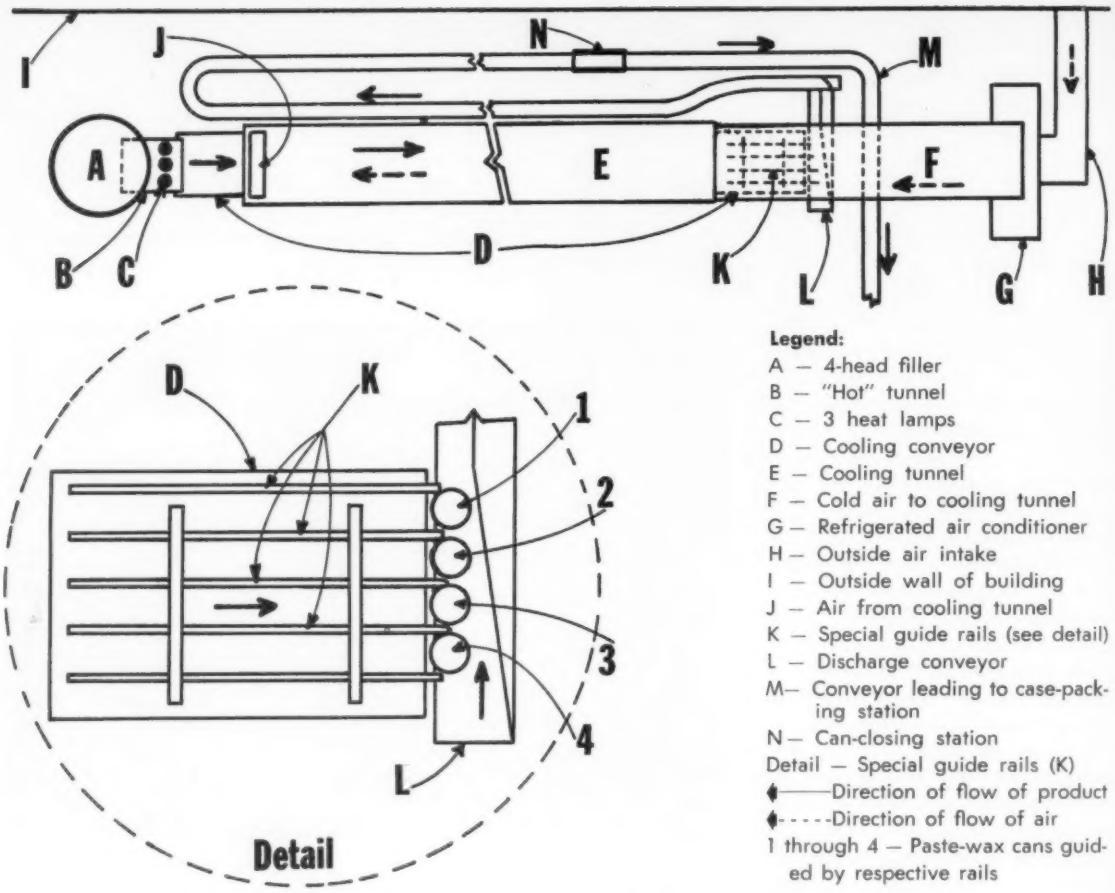


Fig. 3. View of cooling tunnel (a) looking toward product-discharge end. Note duct (arrow) in background which is intake for outside air. This feature utilizes cold air during winter months, resulting in savings in utilities.



Legend:

A — 4-head filler
B — "Hot" tunnel
C — 3 heat lamps
D — Cooling conveyor
E — Cooling tunnel
F — Cold air to cooling tunnel
G — Refrigerated air conditioner
H — Outside air intake
I — Outside wall of building
J — Air from cooling tunnel
K — Special guide rails (see detail)
L — Discharge conveyor
M — Conveyor leading to case-packing station
N — Can-closing station
Detail — Special guide rails (K)
——— Direction of flow of product
- - - - Direction of flow of air
1 through 4 — Paste-wax cans guided by respective rails

Fig. 4. Schematic layout of paste-wax packaging line. With floor space limited, cooling tunnel is only 50 ft. long, but with refrigerated air conditioner, product is cooled adequately. Note special guide rails (detail) (see also Fig. 5) which prevent jams as cans are transferred from cooling conveyor chain to discharge conveyor. Starting with rail which controls movement of can No. 1, note that each successive rail (Nos. 2, 3, 4) protrudes slightly farther than the one before it, thus allowing each can to be "rolled" around end of its respective guide slightly later than preceding one, until all four have been transferred to discharge conveyor. Cycle is then repeated for next row of cans, and so on.

in. electric fans placed strategically over the cooling conveyor. This method was adequate during the cold winter months, but unsatisfactory throughout the summer when the temperature in the packaging room is quite high.

Vibration-Free Conveyor

Incidentally, it is absolutely necessary that the conveyor be vibration-free. If not, because of the large free surface in relation to the small volume, the molten wax will tend to ripple within the can. Upon being cooled, this will result in a wavy, uneven surface which presents a poor appearance to the customer. (See Fig. 2).

Use graphite powder. We accomplished a smooth-running conveyor by applying graphite powder to the pegboard base on which the chain rides. This reduces friction to a minimum. To support the returning portion of the endless chain which rides under the chain base and to take up most of the slack, we installed angle supports on either side running the entire length of the conveyor. The remaining slack is eliminated by idler pulleys.

Change Wax-Filling Temperature

Since we were limited on expenditures and space, a stock build-up of finished product to carry us through the hot summer months was definitely out. We then began a new series of tests revolving around the possibility of using a cooling tunnel. Revisions in the formula were made by the laboratory so that a lower filling temperature could be used. This was established to be 128°F. The temperature to which the revised product had to be cooled and the rate of cooling were yet to be determined.

One factor in controlling the lowest temperature to which the product can be cooled is the condensation of moisture on the inside of the tunnel itself. Should

this occur, the water would drip from the tunnel overhead into the uncovered product.

Cooling conditions established. These facts, however, gave us a starting point and we were able to work up to a practical cooling temperature to yield the smoothness and hardness desired in our paste wax. After much experimentation, we determined that the final temperatures to which the product must be cooled are 80°F. for the shell and 100°F. for the core, with the proper rate of cooling at 2.4°F/min.

With the rate of cooling and the temperature range established, we determined that a 7-1/2-ton refrigerated air conditioner would amply supply the required capacity of cold air for our particular conveyor length when the belt was moving at an approximate speed of 2-1/2 ft/min. The entire line was relocated within three feet of an outside fall for reasons discussed elsewhere in this article. The air conditioning unit was installed about six feet from the discharge end of the cooling conveyor.

The Cooling Tunnel

To form our cooling tunnel, Figs. 3 and 4, we built a sheet metal enclosure 8 in. high over the cooling conveyor chain covering its entire length and width. The two ends, of course, are open. The cold-air discharge from the cooling unit is connected to the top of the tunnel immediately at the end from which the cooled product is discharged. Where it is joined to the tunnel, this duct is positioned at such an angle as to direct the flow of air toward the opposite end of the tunnel from whence the air is discharged. The air temperature, of course, is controlled by thermostats.

Uses outside air in winter. To take advantage of the cold air outside during the winter months, we installed a duct through the outside wall of the room and joined it to the air conditioner, thus effecting a savings in utilities. It is

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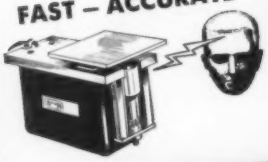

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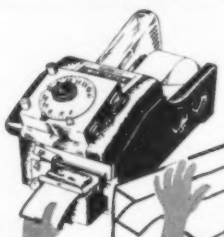

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arranged so that the outside air is drawn in by the blower, but bypasses the cooling coils.

A system of dampers allows us to control the temperature properly. Also, another damper allows intake of air from the packaging room should the tunnel temperature become too cold. By manipulating these various dampers, we are able to maintain a very constant temperature throughout the entire packaging operation—thus, our reasons for locating the line near an outside wall.

The temperature of the air entering the tunnel is about 52°F. Under normal packaging operations, the discharge air temperature is approximately 60°F. Using outside air temperatures of 5° to 20°F., we can safely regulate the air entering the tunnel at 40°F. to 52°F. without causing moisture condensation inside the tunnel.

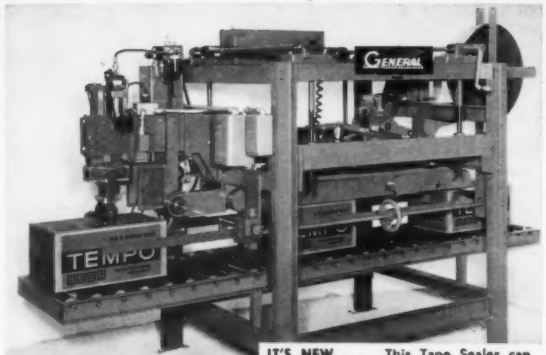
At the end of the cooling tunnel, a discharge conveyor just wide enough to accommodate a single row of cans moves in a direction perpendicular to that of the chain discharging the cans from the tunnel. In order to prevent the cans from jamming up as they are being transferred to this narrow belt, we installed a set of special guide rails, Figs. 4 and 5.

These guides space the four cans equidistantly from one another and allow one can at a time to enter the discharge belt. This is accomplished by adjusting each successive rail so that it protrudes slightly farther than the one before it. Thus, each can is "rolled" around the end of its respective guide slightly later than the preceding one, until all four have been transferred to the discharge belt. Then the cycle is repeated for the next row of cans, and so on.

The discharge conveyor is curved around the corner of the end of the cooling tunnel and connects with the one leading to the closing and packing stations. The latter conveyor is located adjacent to, and outside of, the tunnel. It extends the full length of the tunnel twice, making a hairpin turn at one end. (See Fig. 4).

The total cost of the entire paste-wax packaging line as it is today was approximately $5,000. This can be broken down as follows: $2,600 for additional equipment (including the air conditioner) and materials (we were fortunate in that we had some idle equipment and items which could be used); $1,200 for labor to fabricate and install, and $1,200 for engineering and management personnel. *(End)*

Fig. 5. Special guide rails at discharge end of cooling tunnel which prevent jamming of cans as they are transferred to discharge conveyor chain. (See also Fig. 4).



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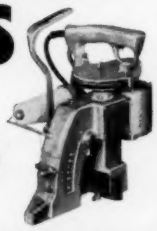

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Bennett Nathanson was graduated from the Virginia Polytechnic Institute with B.S. degrees in mechanical engineering and industrial engineering. He was employed by the Plastics Process Company, Division of United Merchants and Manufacturers, Inc., until 1953 at which time he joined the Styrene Technical Service Department of the Monsanto Chemical Company. He became manager of this department in 1957. He is a member of the Western New England chapter of The Society of Plastics Engineers.

Testing of molded styrene for packaging applications

By Bennett Nathanson,
Technical Service Manager,
Plastics Division,
Monsanto Chemical Company,
Springfield, Massachusetts

Every packaging material must be thoroughly tested to determine its ability to adequately protect a given product before it is put into production. In mentioning some of the applications for styrene, Mr. Nathanson discusses permeability, chemical resistance, and shock resistance tests necessary for this plastic when it is being considered for a specific application. He describes these tests by setting forth four experiments conducted at the Monsanto laboratories, using general purpose and rubber-modified types of styrene.

Within the past few years, styrene plastics have found wide acceptance in many types of packaging applications. A hard, rigid, thermoplastic styrene can be economically injection-molded into many complex shapes. Moreover, by the addition of rubber, it can be toughened considerably to increase its usefulness. This latter type of styrene is known as rubber-modified. Clear, non-modified materials are known as the general purpose types.

Rubber-modified styrenes are more commonly known and referred to as the high-impact types. These toughened styrenes, because of their greater resistance to abuse, are utilized in packages with thinner walls. The slightly less translucency of rubber-modified resins has not been a great deterrent to their application in half-gallon and quart ice cream containers and cottage cheese packages.

What are the characteristics which have made styrene so popular? They include rigidity, inherent crystal clarity (of general purpose styrene), and toughness (of rubber-modified styrene). But let's look at end-use requirements in terms of three important packaging standards, namely:

1. Permeability
   a. Water vapor transmission
   b. Gas transmission
2. Chemical resistance
3. Shock resistance

Permeability

This property is an important factor in the use of any packaging material. It relates to the passage of both moisture and gases. Permeability determines not only the chemical solvent resistance of a material, but whether the material may be used for certain end-use applications.

In some cases, the non-permeability of a material is helpful in keeping outside moisture and gases from penetrating to the packaged substance; in other instances, it serves to prevent the protected goods from losing their moisture content during long storage periods in dry atmospheres.

Some materials which may be effective water barriers may be permeable to gases. This incongruity, however, does not prevent such materials from serving as effective packaging materials, especially if the applications are carefully selected.

(a) **Water Vapor Transmission.** The higher WVTR of styrene, as compared to polyethylene and vinyl, for instance, does not necessarily exclude it from normal applications. Only in certain critical applications where moisture freshness or retention is of importance is this property a limiting factor.

Tests. Water vapor transmission tests were conducted on seven specimens of extruded rubber-modified styrene sheet material. Duplicate samples of each gauge were run in the General Foods chamber at 100° F. and 95 per cent R.H. The average test duration was 168 hours.

Results. The results are shown in Table 1.

Conclusions. Loss of water vapor is not a linear function of thickness. The relationship is approximately parabolic as shown in Fig. 1, which was plotted from the results in Table 1. The WVTR is considerably lessened by increasing wall thicknesses above 0.030 in. General purpose styrene follows the same behavior pattern.

Rubber-modified styrene compounds have slightly greater resistance to water vapor transmission than general purpose compounds, due to the addition of the rubber phase. In our research laboratories, we have found that minor variations in rubber content or processing technique among the high-impact styrenes result in very little change in WVTR on a given scale.

(b) **Gas Transmission.** Gas permeability is another important characteristic of packaging materials. Polyethylene, while having good resistance to water vapor transmission, has high gas permeability, allowing passage of such gases as carbon dioxide and oxygen. Styrene has poorer resistance to gas transmission, as exemplified by the placing of a carbonated beverage into a closed general purpose styrene container of 0.040 in. wall thickness.

In 24 hours, the beverage is flat with no carbonation remaining. To put it quantitatively, gas loss (based on carbon dioxide contained

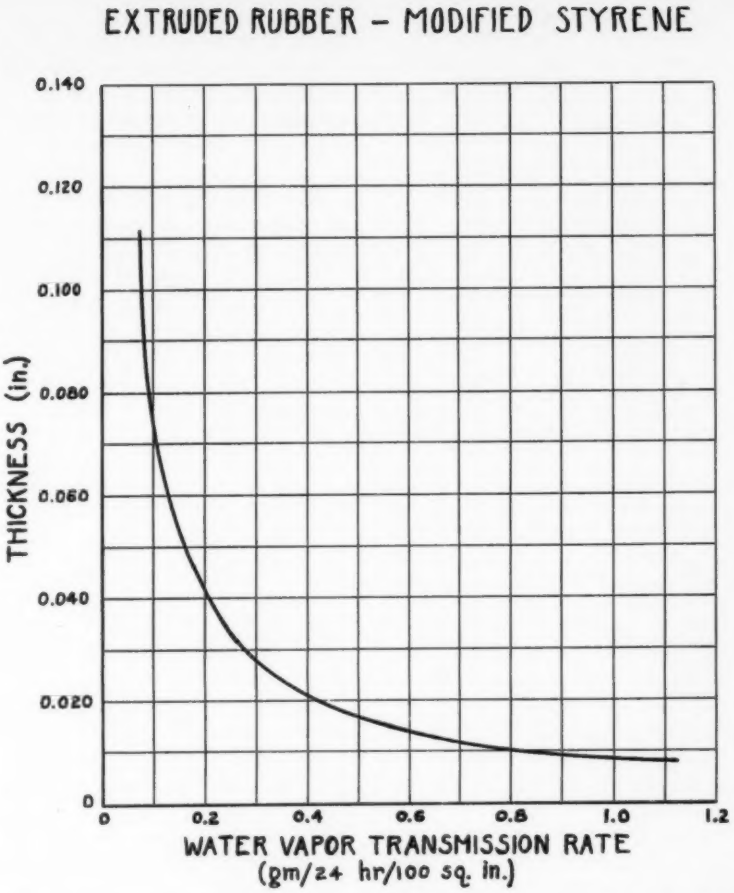

Fig. 1. Water vapor transmission rates of extruded rubber-modified styrene. Note that the loss of water vapor is not a linear function of thickness, but a parabolic one. General purpose styrene follows the same behavior pattern.

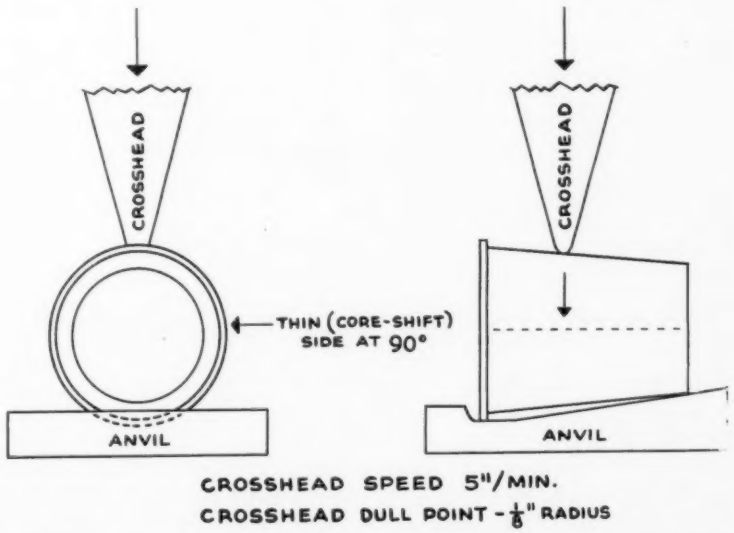

Fig. 2. Compression cell for conducting flexure test of thin-wall containers. It consists basically of an anvil and crosshead.

TABLE 1

Water Vapor Transmission Rates of Extruded Rubber-Modified Styrene

Sheet Thickness (in.)	WVTR* (gm/24 hr/ 100 sq. in.)
0.0073	1.123
0.0075	0.946
0.0115	0.713
0.0105	0.772
0.0147	0.558
0.0157	0.552
0.0205	0.405
0.0206	0.415
0.0308	0.258
0.0306	0.270
0.0408	0.193
0.0417	0.211
0.0960	0.097
0.0950	0.099

*Rate for thickness indicated.
Tests conducted in General Foods chamber at 100° F., 95 per cent R.H., for 168 hr.

under pressure of 40 p.s.i.) in 24 hours is approximately 30 per cent for styrene. If the styrene container could have wall sections of 0.50 in. thickness, the beverage would theoretically retain carbonization for a long period of time. However, the economics of such a thick wall are prohibitive.

Case I. *Purpose*: To determine how gas and water vapor transmission might affect a specific application. A manufacturer wanted to know whether its molded general purpose styrene vials could be used to package cigars. Of specific concern was whether the styrene would be attacked by the volatile substances in the tobacco and whether the "taste" of the cigars would be affected adversely by loss of moisture.

Prior tests had shown that tobacco tars do not attack styrene. It was agreed, therefore, that an organoleptic test should be made to determine the effect of styrene packaging on the taste and quality of the cigars.

Procedure. Three different brands of cigars were selected and packaged in the styrene containers with polyethylene closures. The samples of each brand were divided equally into three groups, each group to be stored for five days under a different set of conditions. These conditions were:

1. 140° F., 50 per cent R.H.
2. 104° F., 100 per cent R.H.
3. 74° F., 50 per cent R.H. (controls).

At the end of the storage period, the coded samples were distributed to a selected panel of five cigar smokers. All panel members, except one, were asked to smoke the cigars and to comment on aroma and flavor. The excepted member was asked to add the cigars to his regular supply and to smoke them in his usual manner. This was done so that he would treat his part of the test with a normal attitude, with normal selection of cigars under his usual smoking habits.

Results. The results of the testing were fairly conclusive. The four panelists, asked to be hypercritical, found that the cigars stored at 140° F., 50 per cent R.H., possessed a strong styrene or coal-tar aroma when "dry-smoked." However, this aroma disappeared after the cigars were lighted. In the cigars held at 104° F., 100 per cent R. H., the aroma was more subtle. The non-critical panel member who customarily lit his cigars without sniffing or sucking at them did not detect this aroma.

Aside from yellowing caused by heat aging (oxidation) at the 140° F. temperature, no attack of any sort was noted on the styrene vials. In practically all cases, the polyethylene closures came loose, probably due to the faulty design. Because of the water-vapor permeability of this type of closure, most glass and styrene cigar vials have a double-walled closure for added protection against moisture loss ("freshness" loss).

Conclusions. Accelerated aging tests indicate that no chemical reaction between the cigars and styrene vials should be expected. Unwrapped cigars in a styrene vial may, over long periods (three months or more), tend to lose their freshness. This is because of the inherent water vapor transmission characteristic of styrene. Wrapping cigars in cellophane eliminates this difficulty, however.

Chemical Resistance

The chemical resistance of styrene is affected by molded-in strains and stresses. Similar stresses occur in metal as a result of the manufacturing process. Sharp fillets, for example, can concentrate the stress at the corner, producing an inherently weaker section. The higher the stress, the lower the critical point at which chemical attack begins. All chemical resistance tests are predicated on the fact that the configuration of the molded parts determines the incidence of high stress areas. Chemical resistance is also affected by ambient temperature conditions—the rate of chemical attack doubling for 18° F. rise above room temperature.

Testing is necessary. Many products can be packaged, but testing of the ingredient/package for any chemical reaction is necessary to determine suitability. Several examples indicate the wide range of testing employed to find opti-

TABLE 2

Comparison of Insulating Qualities of Styrene and Paperboard Ice Cream Containers Filled with Product

Location of Thermocouples	Temperature (°F.)*			
	Styrene		Paperboard	
	0 hr.	2 hr.	0 hr.	2 hr.
Center of container	—7.5	22	—2	23
Inside surface of wall	19	49	22	51
Outside surface of wall	35	54	34	55

*Temperatures shown are averages of three containers tested. Recordings were made at 15-minute intervals for two hours while samples were stored at 73° F. and 50 per cent R.H. Only the initial and final readings shown for brevity.

TABLE 3

Results of Effects of Shave Lotion on Three Types of Styrene Molded Under Two Temperature Conditions

Sample Identification*		Original Weight (gm.)	Weight Increase (gm.) Average Storage†			Visual Rating‡ After Storage†					
						Marring			Crazing		
			24 hr.	48 hr.	168 hr.	24 hr.	48 hr.	168 hr.	24 hr.	48 hr.	168 hr.
Rubber-Modified Styrene:	MMT + 5°...	6.2480	0.0520	0.0686	0.1480	3	3	3	0	0	0
	MMT + 20°...	6.4170	0.0520	0.0716	0.1610	3	3	3	0	0	0
General Purpose Styrene "A":	MMT + 5°...	6.2711	0.0239	0.0389	0.0988	2	3	5	1	2	2
	MMT + 20°...	6.4147	0.0263	0.0398	0.0741	1	3	5	0	1	2
General Purpose Styrene "B":	MMT + 5°...	6.2622	0.0351	0.0558	0.0938	2	3	4	0	0	0
	MMT + 20°...	6.4616	0.0345	0.0554	0.0983	1	2	3	0	0	0

*MMT is Minimum Molding Temperature. Numeral denotes °F. added to MMT for temperature used in molding process.

†Storage conditions: 50° C. ± 1° C. for hours of time indicated.

‡Rating code: 0 - None; 1 - Very slight; 2 - Slight; 3 - Moderate; 4 - Bad; 5 - Very bad.

mum areas of use.

Case II. *Purpose*: To compare insulating qualities of styrene and paperboard ice cream containers.

Procedure. Three specimens of each type of container were equipped with thermocouples. One lead was attached to the inside surface of the wall of each container, one to the outside surface, and one in the middle of each container. The containers were filled with ice cream and conditioned at −10° F. prior to testing. The samples were then transferred to an atmosphere of 73° F., 50 per cent R.H., for defrosting and for checking of temperature increases. The temperatures at each thermocouple were recorded at 15-minute intervals over a period of two hours.

Results. At the end of the two-hour period, no appreciable difference between the temperatures in the two types of containers was noted, that is, at the thermocouples located in the same position in each of the containers. The ranges of temperature rise are shown in Table 2. These results indicated that there is no significant difference between insulating properties of paperboard and styrene.

Referring to Table 2, note that the initial readings were considerably lower at the center thermocouple. This was due to the fact that the ice cream near the surface warmed more rapidly than that in the center.

Results are substantiated by the thermal conductivities of styrene and paperboard which are 2.3 to 3.3 $\times 10^{-4}$ and 5 $\times 10^{-4}$ cal/sec/sq. cm/°C/cm. respectively. In other words, styrene has approximately 35 per cent lower thermal conductivity than paperboard.

Conclusion. Styrene containers can replace conventional paperboard containers from the standpoint of the good insulating qualities of the plastic.

Case III. *Purpose*: To determine if "X" brand electric shave lotion mars or crazes (causes hairline etching due to chemical attack) styrene formations when the styrene is used as a molded jar cover.

Procedure. General purpose styrenes "A" (heat resistance of 188° F.) and "B" (heat resistance of 170° F.), and a rubber-modified styrene were molded into the form of discs on a one-ounce injection-molding machine. Two temperature conditions were used (temperatures of minimum flow, plus 5° F. and 20° F.)

The sample discs had a diameter of 1.75 in. and a thickness of 0.15 in. Each sample was weighed on an analytical balance, the weight recorded, and the samples submerged in the brand "X" electric shave lotion. Samples were then placed into an air oven at 50° C. ±1° C. After 24 hours, samples were removed, dried, weighed, and examined visually for marring and crazing. They were checked again after 48 hours, and after 168 hours (7 days). Grading for marring and crazing was reported according to the following rating system:

0–None	3–Moderate
1–Very slight	4–Bad
2–Slight	5–Very bad

Results. The results are shown in Table 3. It should be noted that in all instances, there was an *increase* in weight of the sample discs. This indicates chemical attack on the styrenes by the shave lotion.

Conclusions. Based on the results in Table 3, it was concluded that "X" brand electric shave lotion mars general purpose styrene "B" and rubber-modified styrene; and mars *and* crazes general purpose styrene "A". These materials, therefore, should not be used as covers for the shave lotion.

Shock Resistance

A requirement of satisfactory market performance is that the packaging material must have adequate strength to withstand shock loads so that no cracking or package failure occurs. We have tested many molded containers in our laboratories and have devised tests which, we believe, correlate well with end-use performance. Two such tests are:

1. Impact test (impingement by a falling ball) simulates point area contacts.

2. Impact test (impingement by a falling blade) simulates the rolling of loaded containers against one another.

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TABLE 4

Comparison in Strengths of 15-oz. and 16-oz. Containers Molded from General Purpose Styrenes

Material*	Container Capacity (oz.)	Mold No.	Wall Thickness (in.)	Stress (lb.)		Deflection (in.)	
				Total Each Container	Average for 5 Containers	Each Container	Average for 5 Containers
Soft flow, 170° F.	15	1	0.031	5.8	5.98	0.22	0.222
			0.031	5.7		0.22	
			0.031	6.0		0.24	
			0.031	6.0		0.21	
			0.0305	6.4		0.21	
Soft flow, 170° F.	15	2	0.031	5.8	5.70	0.21	0.229
			0.031	5.5		0.23	
			0.031	5.8		0.22	
			0.031	5.7		0.215	
			0.031	5.7		0.24	
High heat, 195° F	15	1	0.031	5.4	5.48	0.18	0.186
			0.031	5.5		0.18	
			0.031	5.5		0.19	
			0.031	5.5		0.20	
			0.031	5.5		0.18	
High heat, 195° F	15	2	0.031	5.7	5.62	0.21	0.202
			0.031	5.5		0.18	
			0.031	6.1		0.20	
			0.031	5.5		0.19	
			0.0305	5.3		0.23	
Soft flow, 170° F.	16	A	0.030	11.4	11.4	0.53	0.576
			0.030	10.8		0.56	
			0.0305	11.4		0.57	
			0.030	11.1		0.56	
			0.030	12.3		0.66	
Soft flow, 170° F.	16	B	0.029	9.3	12.0	0.44	0.610
			0.030	10.9		0.56	
			0.030	14.2		0.70	
			0.0295	12.0		0.70	
			0.030	13.7		0.64	

*Temperature is heat-resistance temperature.

The case described below is one in which a flexural test on the empty containers simulates hand flexing which occurs when the side walls inadvertently press toward each other. This situation could occur, perhaps in filling.

Case IV. *Purpose*: To compare the strengths of 15-oz. and 16-oz. containers molded from general purpose styrene.

Procedure. An Instron tester compression cell consisting basically of an anvil and crosshead, Fig. 2, was used for the test. The crosshead possessed a dull point of 1/8 in. radius, and was operated at a speed of 5 in/min. Each container was placed into the cell with its thin side wall at 90° to the direction of force. (See Fig. 2).

Positive pressure was applied until breakage of the container occurred. The force necessary to break the container and the amount of deflection of the side wall were noted.

Results. The results are shown in Table 4. Note that the average stress withstood by, and average deflection of, the 16-oz. containers were about double those of the 15-oz. ones. There was very little difference in stress and deflection between the two types of styrene used in the 15-oz. containers.

Conclusions. Strengths of the containers used in this test varied with size, with the 16-oz. container being about 100 per cent stronger than the 15-oz. This was not necessarily due to the difference in size, but rather to a difference in design taper of the side walls.

Redesign of the 15-oz. wall section was thus found to be in order. A change in molding conditions also brought the strength of the 15-oz. containers up to a satisfactory level.

Future

What, then, is the future of styrene in packaging? Styrene already is utilized to the extent of 45 to 50 million pounds annually in molded and sheet form packaging applications. The material should continue to gain in popularity because of its clarity, rigidity, toughness, and durability. Although there will be some limiting influences, such as moisture and gas permeability, proper end-use selection and proper application will help to expand the market. (*End*)

Packaging Institute announces annual forum

For more information contact Mr. Charles A. Feld, Executive Director, Packaging Institute, 342 Madison Avenue, New York 17, New York. Telephone: Murray Hill 7-8875.

Packaging Institute is holding its 20th Annual Forum on October 13, 14, and 15, in Chicago's Edgewater Beach Hotel. The theme of this year's forum is "Packaging — Food for Thought." The following outline gives a brief description of the program for each day.

Monday, October 13th:

10:00 a.m. Call to order. President's address, by A. Douglas Murphy, Esso Standard Oil Co. Annual business meeting of the Packaging Institute, followed by a closed circuit TV Clupak stretchable paper presentation.

12:15 p.m. Opening luncheon.

1:00 p.m. Keynote address: "Packaging . . . Food for Thought," R. Carl Chandler, Standard Packaging Corp.

2:00 p.m. Three concurrent seminars: *Packaging Research and Development Seminar:* W. T. Nye, Gaylord Container Corp., chairman. Topics to be covered include "it's a set-up (box)!" by Richard Wellbrock, New Jersey Machine Corp.; latest developments in aluminum cans, by L. R. Payton, Reynolds Metals Co.; a technical paper from Michigan State University's School of Packaging, by James W. Goff, School of Packaging, Michigan State University; Drumpaket for shipping bulk granular materials, by H. E. Taylor, Gaylord Container Corp.; a new heat-sealable cold water soluble transparent packaging film, by E. M. Kratz, Mono-Sol Corp., and technical development of Marlex film for packaging uses, by R. Vernon Jones, Phillips Chemical Co.

Production Line and Machinery Seminar: A. R. Schaefer, New Jersey Machine Corp., chairman. Talks will be gearing the production line to a buyer's market, by L. E. Smith, Bristol-Myers Co.; wishful thinking pays off, by C. P. Whittier, Owens-Illinois, and the human ingredients in the packaging stew, by Don S. Shepherd, Winthrop Laboratories.

Package Marketing Seminar: D. A. Johnson, Continental Can Co., chairman. Topics include coordinating packaging with design, research and production, by Albert Kner, Container Corp. of America; the motivational meaning of a package, by William Schlackman, Institute for Motivational Research; the importance of color in

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packaging, by Louis Cheskin, Color Research Institute; predicting package success, by Dr. M. J. Helfgott, Lippincott and Margulies' Package Research Institute; the professional package design comes of age, by Robert Sidney Dickens, Dickens, Inc., and precis of presentation, by William Capitman, The Center for Research in Marketing.

Tuesday, October 14th:

9:30 a.m. Three concurrent seminars: *Drug and Pharmaceutical Seminar:* George Robinson, Merck Sharp and Dohme, chairman. Topics will include pharmaceutical aerosol laboratory developments, by Edwin Pomerantz, Chas. Pfizer & Co., Inc.; Rx for aerosol packaging through contract packagers, by John C. Armstrong, Armstrong Laboratories; Rx for aerosol packaging — do it yourself, by Robert A. Foresman, Jr., aerosol consultant, and cost substantiation of aerosol packaging, by Samuel Prussin, Aerosol Techniques, Inc.

Bag and Industrial Packaging Seminar: Howard Voorhees, Union Carbide Corp., chairman. Talks will include wirebound-corrugated containers for bulk shipment of granular and powdered materials, by Henry A. Wolsdorf, Package Research Laboratory; multiwall bag sewn closures — reviewed and appraised, by T. E. Dowling, American Cyanamid Co.; what's new in flexible industrial containers; by J. Sandford, E. I. du Pont de Nemours & Co., and how to design and test unit loads, by Walter Friedman, Container Laboratories, Inc.

Printed Folding Box Seminar: L. H. Cassert, Industrial Packaging Co., Div. Continental Paper Co., chairman. Under the major heading of "The Experts Evaluate the Five Major Printing Processes," the following topics will be discussed: Letterpress, by J. K. Higgins, National Folding Box Co., Div. Federal Paper Board Co.; lithography, by Richard Walters, U. S. Printing and Lithograph Co.; flexography, by Richard Wells, Badger Carton Co.; screen process, by Fred Braun, Color Reproductions Co., and gravure, by J. A. Rogers, Boxboard and Folding Carton Div. of Continental Can Co.

2:00 p.m. Three concurrent seminars: *Drug and Pharmaceutical Seminar,* continued: Howard Berger, Smith, Kline and French Laboratories, chairman. Topics include packaging hard-to-hold products in polyethylene, by J. D. Czarnecki, Bradley Container Corp.; lined polyethylene bottles, by J. H. Parliman, Plax Corp., internal linings for plastic containers, by Ralph H. Thomas, Bristol-Myers Co. (Over)

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Food Packaging Seminar: L. J. Hayhurst, National Dairy Products Corp., chairman. Talks will include food packaging — the show case that sells, by JoAnn Shurpit, Libby McNeil & Libby; today's and tomorrow's materials for consumer packaging of foods, by J. M. Heinen, Continental Can Co.; a case study of market development and package acceptance of the Tetra Pak method, by E. C. Garwood, Crown Zellerbach Corp.; pathological aspects of prepackaging fruit and vegetables, by G. R. DiMarco, Rutgers, State University, and new plastic package for lemon juice, by Owen K. Burman, Exchange Lemon Div., Sunkist Growers.

Hardware Packaging Seminar: Roy D. Connell, J. Wiss and Sons, chairman. Topics to be covered include packaging needs of consumer versus industrial in hardware products, by W. H. Drews, The Black & Decker Mfg. Co.; the builders hardware industry combines consumer packaging with long established industrial, by F. S. Haniewich, The Yale & Towne Mfg. Co., and hardware packaging to meet the needs of the modern hardware merchant, by Walter L. Wirth, National Retail Hardware Association.

Wednesday, October 15th:

9:30 a.m. Three concurrent seminars: *Production Line and Machinery Seminar,* continued: E. M. Wixted, Schering Corp., chairman. Talks will include minimizing adhesion production problems, by H. E. Smith, Hiram Walker & Sons, Inc.; importance of effective training of packaging personnel, by R. E. Mottin, Parke, Davis & Co., and factors affecting packaging line layout, by Hugh Lyons, Merck Sharpe & Dohme.

Closure Seminar: Robert C. Dewey, Dewey and Almy Chemical Co., chairman. Topics include selecting closures for food packaging, by L. A. Von Till, Kraft Foods, Co.; modern closure coatings, by G. M. Shiffler, Stoner-Mudge Co., Div. American-Marietta Co.; modern closures of aluminum, by A. G. Osborne, Aluminum Company of America, and why the universal cap liner is such a remote possibility, by Tracy Cowen, Standard Insulation Co.

Flexible Packaging Seminar: P. B. Reuman, E. I. du Pont de Nemours & Co., chairman. Talks will cover review and outlook of flexible packaging, by Charles A. Lewis, U. S. Dept. of Commerce; the polyolefin resins and their future possibilities, by Chas. A. Southwick, Jr., Modern Packaging magazine; films for prepared foods, by Dr. R. E. Morse, Rutgers, State University; film and foil combinations of the future, by Ross C. Reed, The Dobeckmun Co., and packaging meats for self service, by J. M. Ramsbottom, Swift & Co.

2:30 p.m. Joint Packaging Institute-SIPMHE special technical sessions at the Chicago Coliseum: A. W. Hoffman, Robert Gair Paper Products Group, Continental Can Co., and Charles J. Zusi, packaging consultant co-chairmen. Talks will include the story behind the planning of Johnson & Johnson's new plant of tomorrow, by F. P. Coons, Johnson & Johnson; development of palletless unit loading at P & G, by Arthur Spinanger, The Procter & Gamble Co.; environmental hazards of domestic and export packaging, by R. W. Macomber, Insurance Co. of North America, and plotting the future of packaging and handling manpower, by W. A. Lyman, Case Institute of Technology.

A special event during all three days of the forum will be the combined display of prize winning packages of National Paper Box Manufacturers Association, National Flexible Packaging Association, Fibre Box Association, and Folding Paper Box Association of America.

See Page 64 for a brief description of SIPMHE's show and short course, also being held in October.

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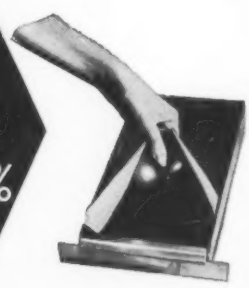

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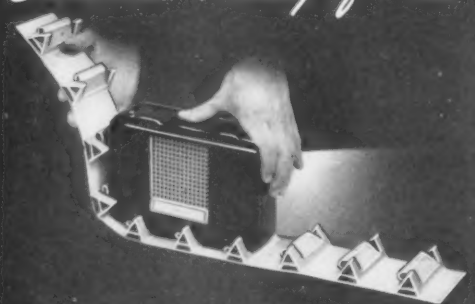

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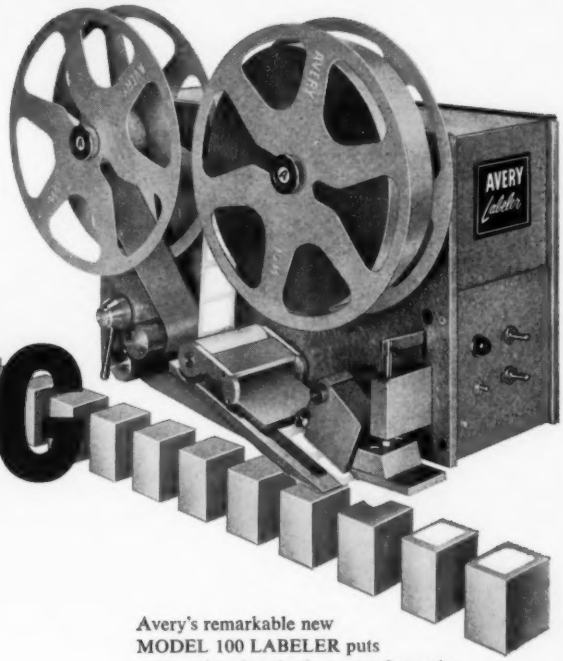

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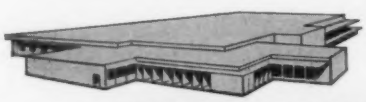

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SIPMHE announces packaging, handling and shipping show, short course

For more information contact Mr. Charles J. Carney, Jr., Managing Director, Society of Industrial Packaging and Materials Handling Engineers, Suite 1534, 14 East Jackson Boulevard, Chicago 4, Illinois. Telephone: Harrison 7-6123..

The Society of Industrial Packaging and Materials Handling Engineers will hold its 13th National Industrial Packaging, Handling and Shipping Show on October 14, 15, and 16, in the Chicago Coliseum. The exposition hours will be from 12 noon to 6:00 p.m. on Tuesday, October 14; 12 noon to 9:00 p.m. on Wednesday, October 15, and 10:00 a.m. to 4:00 p.m. on Thursday, October 16.

The group will offer its annual educational short course on October 13, 14, and 15, with all sessions except one meeting on the second floor of the YMCA building, 826 South Wabash Avenue. The exception is the joint SIPMHE-Packaging Institute session on Wednesday, October 15, at 2:30 p.m., which will be held in the Chicago Coliseum.

On Monday, October 13, short course session hours will be from 9:00 a.m. to 12 noon, with the same sessions repeated in the afternoon from 1:00 p.m. to 4:00 p.m. On Tuesday and Wednesday, October 14 and 15, sessions are from 9:00 a.m. to 11:00 a.m., with repeats scheduled for 11:00 a.m. until 1:00 p.m. The following outline gives a brief description of each short course session.

The Packaging & Shipping sessions include the following:

Monday, Oct. 13, 9:00 a.m.

Session I. *Practical Engineering Refresher:* Robert K. Newton, Engineering Extension, University of Illinois, chairman. Included will be talks on physics—elemental treatment of mechanics, forces velocities, momentum and vectors, gravity and acceleration, friction, work and power, by Dr. Edward B. McNeil, Dept. of Physics, University of Illinois; mathematics—trigonometry, angular relationships, sine, co-sine, tangents, slide rule applications, ratios, data plotting and meaningful interpretation, by J. A. Henry, Mechanical Engineering Dept., University of Illinois, and chemistry—bacteriology, contamination, deterioration, and corrosion prevention by Dr. M. P. Steinberg, Dept. of Food Technology, University of Illinois.

Session II. *Protective Package Design for Shipping:* Chairman to be announced. Topics include evolving and specifying the package cushion, by R. K. Stern, U.S.D.A., Forest Products Laboratories; advanced design in corrugated boxes and inner-packing, by James P. Corcoran, Central Fibre Products Co., and trends and improvements in heavy shipping containers, the speaker will be announced later.

Session III. *Paper, Films, Foils—Wonders of the Packaging World:* Chairman to be announced. Topics include kraft paper—expanding staple of protective packaging, speaker to be announced; plastic films, modern day miracle, by M. J. Odell, Ludlow Papers, Inc., and aluminum foils and forms, the glamour guard of packaging, by Merrill A. Grogel, Reynolds Metals Co.

Tuesday, Oct. 14, 9:00 a.m.

Session I. *Practical Engineering Refresher:* K. J. Trigger, Mechanical Engineering Dept., University of Illinois, chairman. Topics include strength of materials, simple structures, beams, bending, elasticity, stiffness, springs in cushioning, in metals, wood paper and plastics, by J. O. Smith, Mechanical Engineering Dept. University of Illinois, and statistical quality control—versatile safeguard, by G. F. Schrader, Mechanical Engineering Dept., University of Illinois.

Session II. *Two Faces of Packaging—Mail Order and Retail:* Chairman to be announced. Topics include mail order packaging—60,000 items can't go wrong, by R. H. Witting, Montgomery Ward & Co., and coordinating packaging development to clinch retail sales, by D. J. Leeker, Sears Roebuck & Co.

Session III. *The Packaging Engineer and Management:* Chairman to be announced. Talks include putting the packaging program into production, by Elaine R. Pitts, Sperry & Hutchinson Co., and economics in industrial packaging design, by Frank W. Green, F. W. Green Co.

Wednesday, Oct. 15, 9:00 a.m.

Session I. *The Package and Long Distance Shipping;* Chairman to be announced. Talks include export packaging and shipping from the Midwest, by R. C. Lambrecht, Electromotive Div., General Motors Corp., and air freight packaging, handling, shipping new distribution concept, speaker to be announced.

Session II. *Streamlining the Shipping Room:* Chairman to be announced. Talks include the machine age comes to the shipping room, by by Walter Pisarski, Stewart-Warner Corp., and up-dating loading and bracing, by A. P. Kiulin, Association of American Railroads.

The Materials Handling sessions include the following:

Monday, Oct. 13, 9:00 a.m.

Session I. *Proving the need for materials handling:* George F. Schrader, University of Illinois, Mechanical Engineering Dept., chairman. Talks

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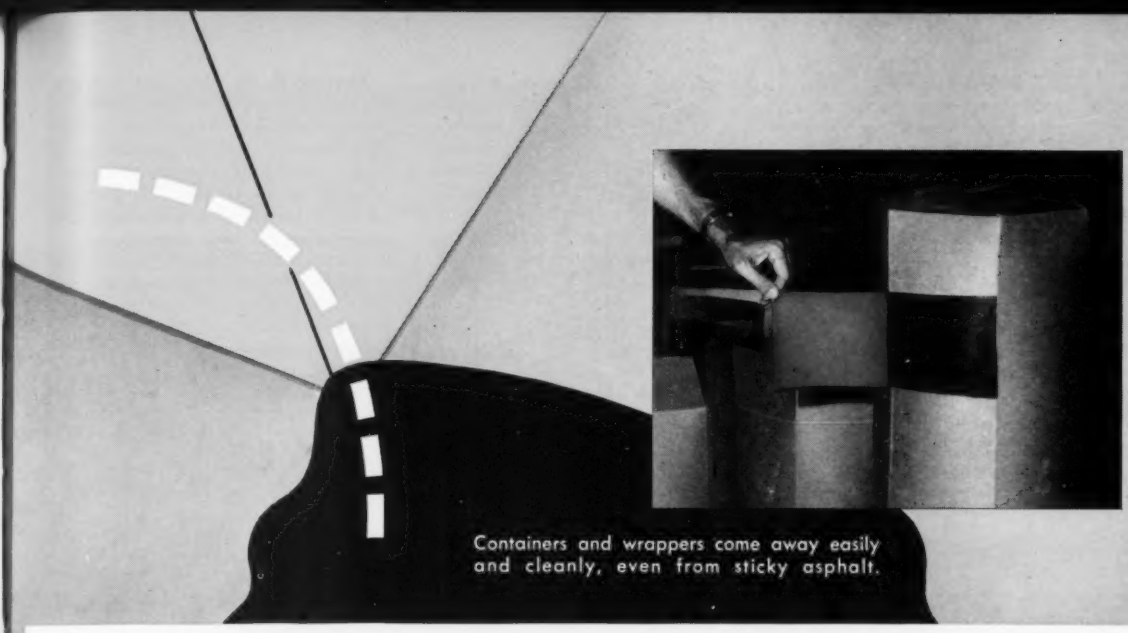

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will include potential of materials handling to all companies, speaker to be announced; modern techniques for the analysis of materials handling operations, by Dr. William T. Morris, Dept. of Industrial Engineering, Ohio State University, and optimal assignments of materials handling equipment through linear programming, by Dr. Paul H. Randolph, Dept. of Industrial Engineering, Purdue University.

Session II. *Layout—Partner or Competitor:* A. R. Vaughn, Crane Co., chairman. Talks will include single story analysis and planning, by Ray Carlen, Joseph T. Ryerson & Sons; multi-story analysis and planning, by James Chapman, Carson Pirie Scott & Co., and yard storage analysis and planning, by Robert Waldren, Hyster Co.

Session III. *Containerization:* Herbert Richmond, A. T. Kearney Co., chairman. Talks will be given by Carl E. Thorkelson and Garth L. Owen, Thornel Associates, on the advantages of containerization from disposable container to carrier as a package, modular packaging, in layout, production and processing, and warehousing.

Tuesday, Oct. 14, 9:00 a.m.

Session I. *Manual Handling, Economic Necessity:* H. P. Dolan, Caster & Floor Truck Manufacturers Association, chairman. Talks will include manual handling equipment and applications, by K. F. Heath, Nutting Truck and Caster Co., and another look at manual equipment values, by F. S. Macomber, A. T. Kearney Co.

Session II. *Mechanical Handling Equipment — Answer to Volume:* J. W. McReynolds, Lighting Research Laboratories, Inc., chairman. Talks will cover production, processing, warehousing, automated, by Thomas A. McEwan, T. S. McEwan & Associates; production, processing, warehousing, semi-automatic, by Bert Woldring, Rapids-Standard Corp., and yard — intra and inter plant handling, by W. L. Utley, Towmotor Corp.

Wednesday, Oct. 15, 9:00 a.m.

Session I. *Work Simplification in Packaging, Handling, and Shipping:* K. J. Trigger, Mechanical Engineering Dept., University of Illinois, chairman. Talks will include principles of work simplification by L. C. Pigage, Mechanical Engineering Dept., University of Illinois; application of work simplification—the paper work phase (how and results) by R. E. Field, Motorola, Inc., and application of work simplification—the factory phase (how and results) by J. C. Baritski, Bell and Howell Co.

Session II. *The New Look in Warehousing:* Allen D. Walters, American Warehouseman's Association, chairman. Speakers will be announced to discuss small and medium size warehousing—backbone of supply and distribution; receiving and storage, and order assembly and shipping.

Session III. *Financial Justification of Project Proposals:* George Harper, Mechanical Engineering Dept., University of Illinois, chairman. Talks will include application of statistical techniques to making cost estimates more realistic, by L. E. Doyle, Mechanical Engineering Dept., University of Illinois; bringing the MAPI formula up to date, by Dr. Gerald Matchett, National Center for Education & Research in Equipment Policy, Illinois Institute of Technology, and cost accounting in materials handling and packaging, by Dr. Robert I. Dickey, College of Commerce, University of Illinois.

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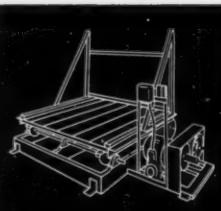

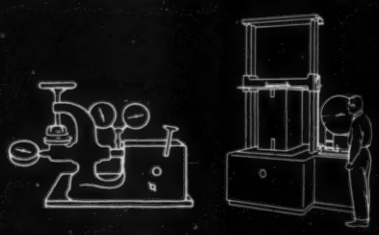

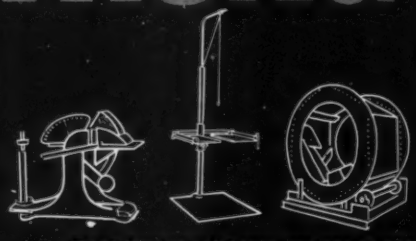

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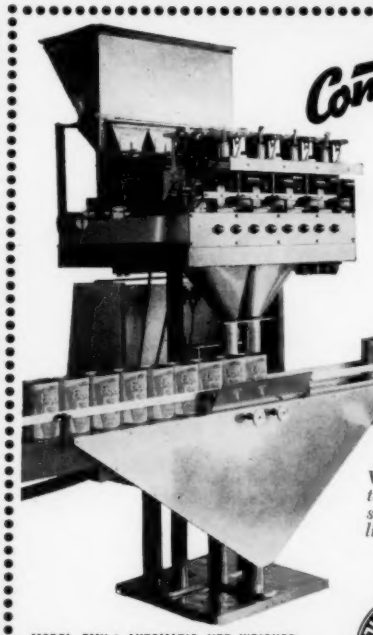

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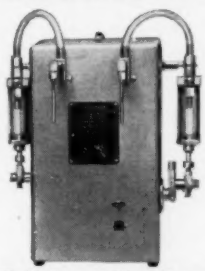

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Skid-Resistant Corrugated Boxes

Olin Mathieson Chemical Corp. has introduced a new type of corrugated container which resists skidding. Called "Skid-Master," the containers feature non-skid properties built right into the board at the paper mill. Among the advantages of the new containers are their easy sealability, unchanged appearance, scuff-resistance, and printability. Circle No. 1.

High-Speed Poly Wrapping

Battle Creek Packaging Machines, Inc., announces development of Model 475, a wrapping machine designed for "weld-sealing" unsupported polyethylene and other soft plastic films at speeds up to 75 pkgs/min. Sizes accommodated range from 4-3/4" to 12-1/2" long, 3" to 8" wide, and 1/2" to 4-1/2" high. Films handled include cellophane, waxed paper, laminated foils, polyethylene, polyester, cellulose acetate, etc. Registering devices for printed packages and printing and labeling attachments are available. Machine can be furnished with either end-fold or underneath-fold. Circle No. 2.

Hot Melt Spot Label Glue

Morningstar-Paisley, Inc., has developed a hot melt spot label glue for can labeling machines that will work on both hot (160° F.) and cold (40° F.) cans and bottles. Called M-P No. 144, this adhesive works as a regular hot pick-up gum. It will machine at more than 500 cans/min. on any standard labeling unit and apply a permanent bond. No. 144 is a resin adhesive containing chemical additives, has a melting point of 225° F. and a fast bonding or setting time. It is available in five-gallon pails. Circle No. 3.

Transparent Plastic Packaging System

Eastman Chemical Products, Inc., has developed a new type of transparent plastic packaging system in which butyrate plastic sheet is heated and drawn down skin-tight over the products being packaged so that they are enclosed and held securely by the clear plastic. The new method eliminates the necessity for any kind of backing board, with resultant savings in material and labor. The part of the sheet that is not formed over the articles becomes a semi-rigid flat surface which can be punched with perforations around the packaged units to permit their removal at point of sale. Circle No. 4.

Constant Motion Packer

R. A. Jones & Co., Inc., announces the new CMP constant motion packer, capable of operating at speeds of 1,200 cans (50 cases)/min. The machine receives cans directly from the line, separates them automatically into six lanes, and indexes the cans from each line in groups of four directly into constantly moving conveyor buckets. The machine automatically feeds cases from a magazine (holding a three-minute supply of cases), opens the cases by insertion of an opening knife, and deposits the opened case into a constantly moving case transport. As the groups of 24 cans in the conveyor buckets and the corresponding cases in the carton transport move through the machine in parallel lines, a constant motion loading mechanism gradually pushes the cans into the cases. Circle No. 5.

Moisture Resistant Corrugated

Hinde & Dauch has developed a new corrugated board that withstands the water of hydro-cooling and top icing packing methods of the fresh fruit and produce industries. Designated M/R (moisture-resistant) board, it has proven to be considerably stronger than ordinary board when subjected to certain humidity conditions. Special box designs now in use feature easy set-up, handholes to facilitate handling, and additional die cut holes around the bottom of the box to speed the flow of water through fruit or produce. Circle No. 6.

Hot Melt Adhesive Applicator

United Shoe Machinery Corp. has designed an applicator for feeding, melting, and applying cord-like adhesives. Called the Thermogrip Applicator Model CW, it uses a transfer wheel method of applying the molten adhesive to individual passing package surfaces or other objects. The wheel can be designed to apply a variety of patterns. Typical applications include package ends, tabs, or sides, tip-ons, and other non-package operations where automatic glue assembly is desired. Circle No. 7.

Plastic Soft Drink Cases

The Richardson Co. announces the development of a new type of plastic soft drink delivery case. Constucted of "super-tough" material, the case offers high resistance to rot and fungus growth, eliminates the danger of splinters, and is washable. It is dimensioned to provide interchangeability with wooden cases, so no major change is required in introducing this case into a bottling plant. Circle No. 8.

Non-Curl Foil Label Stock

Cochran Foil Corp. announces a new laminated aluminum foil label stock, Kurl-Kure, claimed to virtually eliminate many of the curling problems associated with the printing, cutting, and applying of foil labels. The new stock is said to stay flat through a wide range of temperature and humidity conditions. Circle No. 9.

Clear Polyethylene Overwrapping

U. S. Industrial Chemicals Co. is producing a clear polyethylene film for overwrapping or bagging operations. A cast Petrothene polyethylene film, it possesses high sparkle and extreme clarity. It is free of haze and can be readily treated for printing, U. S. Industrial says. Circle No. 10.

what sterilizing medium is best suited to your needs?

CASTLE ENGINEERED STERILIZATION

Steam?... Dry Heat?... Or Gas?

With the discovery of new media it is now possible to integrate sterilization into your production program. It is possible to sterilize materials which could be injured by dry heat or steam. And it is possible in many cases to sterilize the packaged product.

Castle engineers are prepared to discuss with you *any* sterilizing medium —whether new or conventional—that is best suited to your needs.

You will profit from the 75 years of research and experience behind the Castle Engineered Sterilization Program.

Send for this FREE Brochure

Shows how CES helps solve your sterilization problems. Presents latest developments in dry heat, steam and GAS.

STERILIZATION MOLDED TO YOUR NEEDS

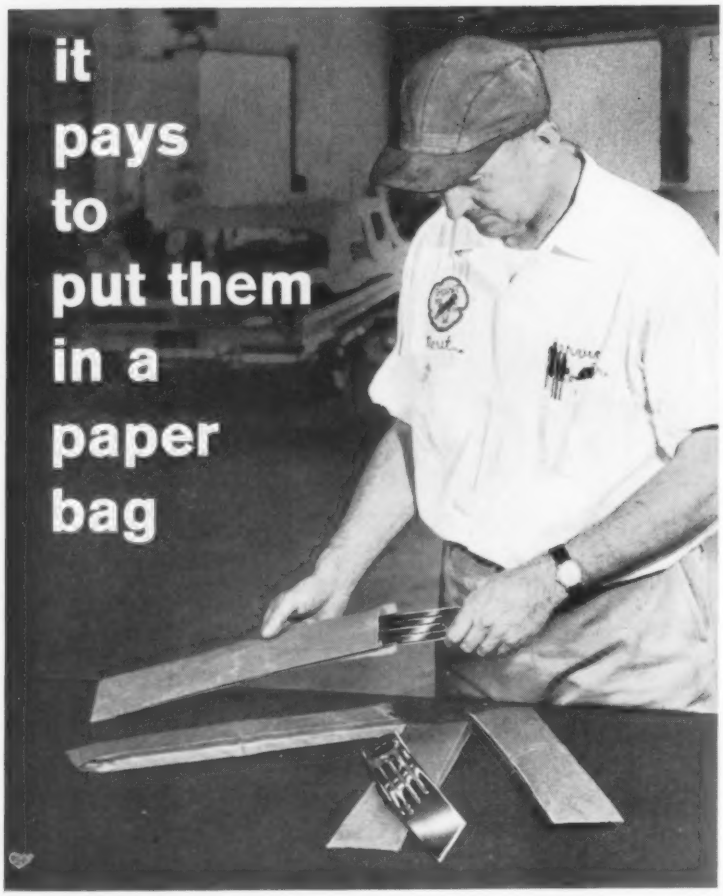
NEW: Now CES makes gas available for terminal sterilization. This process enables gas to penetrate and sterilize the contents of sealed packages. The CES brochure supplies complete details on the economic use of gas sterilization.

WILMOT CASTLE COMPANY

1716-E E. HENRIETTA ROAD • ROCHESTER 18, NEW YORK

Circle No. 252 on Card

when you pack and ship PRECISION PARTS



Here's an "economy move" you may have overlooked! By shipping high-finish, precision assemblies in paper bags you lower freight costs. You save packaging time. You reduce damage claims—build customer goodwill.

Each custom-made bag illustrated, packs a reveal moulding used in automobile assembly. Bags are waxed kraft, moisture-proof. They seal out dust—completely safeguard polished surfaces from scratching in transit and storage.

Versatile lightweight paper bags are proving the least expensive, most effective packaging for thousands of different products today. How much could they save you? Write for free booklet CP-1.

union camp

Commercial Packaging

UNION BAG-CAMP PAPER
CORPORATION

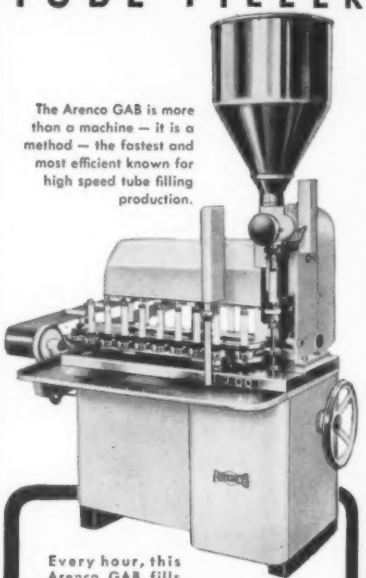
233 BROADWAY, NEW YORK 7, N. Y.

Preferred

FOR
PRECISION
AND
PERFORMANCE

THE
ARENCO g.a.b.
TUBE FILLER

The Arenco GAB is more than a machine — it is a method — the fastest and most efficient known for high speed tube filling production.



Every hour, this Arenco GAB fills and closes up to 3,000 collapsible tubes, depending on material. It positions, tightens cap, codes and discharges to conveyor line. All the operator does is load!

OTHER FEATURES INCLUDE:

Product viscosity maintained
Positively clean tubes
Quick change of product or tube size
All parts accessible for easy sterilization
Fully adjustable for volume variation
No-tube, no-fill
Adaptable to almost any type of closure

Advanced engineering and production know-how makes Arenco a truly modern filling machine — available at a practical cost. Facts that tell the complete story are yours for the asking. Write for them today!

ARENCO

MACHINE COMPANY, INCORPORATED
25 West 43rd Street • New York 36, N. Y.

For more information circle No. 253 on Reader Service Card

Circle No. 254 on Card

Industry literature available free

1. Beneath each announcement is a code number. As you select items on which you want more information, *note* this number.
2. Now, *circle* the corresponding numbers on the postcard, located inside back cover.
3. Next, *fill* in your name and address.
4. Then, *mail* the card — we pay the postage.

Lube Oil Filler

The Pfaudler Co. offers Bulletin 964 describing its new lube oil filler. Speeds of 600 qts./min. are attained without losing the requirements of clean, accurate fill. Specifications and a detailed drawing are included. Circle No. **101.**

Vibratory Machinery

Syntron Co. has released Catalog No. 586 containing illustrations, descriptions, and specifications for such equipment as vibrators, packers and jolters, car rappers, hopper level switches, flow control valves, electromagnetic feeders, conveyors, elevators, test sieve shakers, weigh-feed equipment, parts feeders, and many other types of machines. Circle No. **102.**

Industrial Adhesives

LePage's Inc. has made available a complete catalog of its industrial adhesive products. Price and product information is included for each, as well as a listing of major uses, Circle No. **103.**

Electronic Counters/Controls

Post Machinery Co., Electronics Div., is offering Bulletin B, which briefly describes its line of electronic counters, controls, photoheads, and accessories. It is profusely illustrated. Circle No. **104.**

Fibre Cans and Tubes

The Cleveland Container Co. has a packaging brochure that provides detailed construction drawings of its line of convolute and spirally-wound fibre cans, tubes, and specialty metal closures. These packages are suitable for all types of dry, granular products in the food, drug, and chemical specialties industries as well as for spare parts, hardware items, etc. Cans are lined with moisture and grease-resistant, and anti-Corrosive liners. Circle No. **105.**

Automatic Packaging Line

Bartelt Engineering Co. offers a current four-page brochure describing its automatic packaging line. The machine forms pouch packages from roll stock, fills, seals, and conveys to cartoner, and then cartons. It handles a wide variety of products such as liquids, pastes, hardware, etc., and will accommodate a variety of carton styles and sizes. Circle No. **106.**

Cushioned Shipping Bags

Jiffy Mfg. Co. offers samples and descriptive material on its line of padded shipping bags. Three new types of bags are now available. They include a padded shipping bag made with a mesh reinforced outer liner, a heavy-duty shipping bag with an outer liner of slick 90 lb. Beaming kraft, and a utility shipping bag, unpadded, constructed of 100 lb. stock. Circle No. **107.**

Limit Switches

General Electric has a bulletin, GEA-6131A, describing a number of lever type and rotating cam type limit switches. These switches were developed for the control of machinery travel, machine tools, battery truck lift platforms, automatic conveyors and balers, safety interlocks on enclosing cases, etc. The bulletin contains many illustrations and diagrams of various types of switches, as well as price and ordering information. Circle No. **108.**

Steel Strapping Sealers

Acme Steel Co. offers information on two new sealers it has developed for use with steel strappings. Model C11C10 produces a single set of notches in the seal with each stroke of the operating handle, and Model C11D10 makes a sealed joint consisting of a double set of reverse notches. Both tools are lightweight and easily positioned. Circle No. **109.**

Automatic Cartoning Equipment

Container Equipment Corp. has prepared a 16-page booklet describing its Model 40 automatic cartoner, Model 45 automatic packaging machine; Model 50 automatic bucket feed cartoner, and Model 3901 carton glue sealing machine. Illustrations of the machines are included. Circle No. **110.**

Paper, Paperboard, Foil Coatings

Pyroxylin Products has released a four-page data folder giving end use recommendations for its gravure and flexographic top lacquers. Data is presented in tabular form, listing package characteristics desired and recommended coating. Also included is a chart giving physical data on solvents used in gravure and flexographic lacquers and inks. Circle No. **111.**

Vibratory Feeders

Eriez Mfg. Co. manufactures a new type of vibratory feeder that is available in five different models, described in current product literature. Featuring an electro-permanent magnetic drive these feeders offer full feed or dribble feed with up to + or — 2% control on most materials. Units will handle dry materials ranging in density from 40 to 150 lbs/cu. ft., for a multitude of feeding operations including spreading, separating, and proportioning prior to filling. Circle No. **112.**

Automatic Tray Gluing Machine

The Ohio Boxboard Co. has published a four-page bulletin describing the Midget, a low cost, medium capacity, automatic carton forming machine. It will erect trays, two-piece telescope cartons, hinged cover trays, and display units. Machine features rapid size changeover, it is mounted on casters, and is readily portable. It can be set for one-at-a-time production to eliminate a conveyor line, or it can operate continuously. Circle No. **113.**

Facts About Pliofilm

The Goodyear Tire & Rubber Co. Packaging Films Dept. offers a comprehensive illustrated brochure that provides a non-technical description of Pliofilm; it is entitled "Facts You Should Know About Pliofilm." It discusses in detail methods of ordering, handling, printing, etc. Yield and physical data charts are included as well as a comprehensive end use chart which lists helpful suggestions on specifying the proper grade and weight Pliofilm for a specific packaging application. Circle No. **114.**

Impact Recorders

The Impact-O-Graph Corp. has a four-page bulletin that describes various models of its impact, acceleration, and gravity recorders. These instruments are small in size and light in weight. They record data permanently on a special wax-coated recording tape. The machines are designed to record shocks, impacts, and vibrations from any direction. A list of specificatons and other features of the various models is included. Circle No. **115.**

Marking Machines

Industrial Marking Equipment Co., Inc., has published a catalog covering its entire line of marking, dating, and coding machines. Profusely illustrated, this catalog gives detailed technical data on the Whippet Market, #7 Autoprinter, Rainbow Coder, and other standard units. It outlines base lock types and logos, as well as showing many of the custom-designed marking machines for special application throughout industry. Circle No. **116.**

Steel Drums

Vulcan Containers, Inc., offers literature on its various types of drums. Included in one folder are descriptions of open head and tight head drums (55 gal. capacity), 15-gal. drums (both open and tight head), grease drums (120-lb. and 100-lb. capacity), and 55-gal. agitator

at Rich Products

Aerosol filling spurts 50% with rotary piston filler

During the past six months Rich Products has increased production output for aerosol packed whipped dessert topping by a full 50%. At the same time line personnel was cut by one-half.

A major reason for this increase was Rich's switch to a Pfaudler rotary piston filler.

Fast fill without spill—Rich fills from 20,000 to 40,000 seven- and twelve-ounce cans in an 8 hr. day. In spite of this speed and in spite of the small can openings, Rich holds accuracy to one or two grams on both sizes.

Easy sanitation—There's no place for a food product to get trapped on a Pfaudler filler. Cleaning is so simple, Rich accomplishes it with one man in just one-half hour. He removes only two parts at each station to get thorough cleaning. Rich reports that the bacteria count on toppings is ZERO.

Easy maintenance, too—Rich has had absolutely no maintenance other than routine cleaning and lubrication. Not one minute of production time has been lost to breakdown or parts replacement.

Just right for heavy products in aerosol—Pfaudler fillers are particularly well suited to heavy foods like Rich's topping and also to such products as tooth paste and shaving creams.

Send for bulletin—For details on the six-station filler Rich Products uses as well as larger Pfaudler Fillers, write for Bulletin No. 911.

PACKAGE EQUIPMENT BY PFAUDLER

THE PFAUDLER CO.
a division of PFAUDLER PERMUTIT INC.
Dept. PE-118, Rochester 3, N.Y.

Please send bulletins on ☐ Rotary Piston Fillers; ☐ Glassed-Steel Storage Tanks; ☐ Heat Exchangers; ☐ Centrifuges; ☐ Dryer-Blenders; ☐ Wiped-Film Evaporators.

Name.....
Title.....
Company.....
Street.....
City.....
Zone.....State.....

drums. All drums are available with a choice of interior: Plain steel, rust preventative, or Hi-Bake protective lining. Exteriors on all drums may be painted to individual specifications. Circle No. **117.**

Automatic Wrapping Machine

Schooler Mfg. Co. has prepared a four-page brochure on its Wrapmaster wrapping machine. It wraps using cellophane, waxed paper, or foil with seal made on longitudinal edge giving unbroken panel visibility on all four sides. Machine is adjustable from 12″×7-1/2″×2-1/2″ to 2-1/2″×2″×1-1/2″. Circle No. **118.**

Engineers Check List

Riegel Paper Corp. has a packaging engineer's check list for the selection of flexible packaging materials. This list not only covers 21 points which a packaging engineer must check, but also has an enumeration of simplified explanations of factors that arise in material selection. Circle No. **119.**

Cartoning Equipment

F. B. Redington Co. offers a folder on its Automax, a single-operator cycle cartoner that feeds, expands, and places cartons in conveyor pockets. When the operator places tubes, bottles, or other solid or semi-solid articles in the three-place loading trough, slides it forward to insert the product, the Automax closes the package by tucking in the end flaps and discharges it to the conveyor or packing table. Finished packages can be produced at speeds up to 45-50/min. Circle No. **120.**

Counting And Imprinting Machine

Pitney-Bowes, Inc., offers two pieces of literature describing the Tickometer, a counting and imprinting machine for automatically counting, dating, coding, and imprinting labels, tags, cartons, etc., at speeds from 500 to 1,000 pieces min. A ten-page brochure, "Your Employees' Time Is Too Valuable to Waste," gives specifications and operating features of this machine. A separate bulletin of twelve case studies of savings attributed to the use of this unit is also included. Circle No. **121.**

Polystyrene Packages

The Dow Chemical Co. has released a 24-page "Supplement to a Catalog of Packages." Illustrations and specifications of over 60 different polystyrene container styles are included as well as the names and addresses of molders producing them. Square, round, rectangular, and irregularly-shaped containers, vials, and tumblers are available. Circle No. **122.**

Moistureproof/Greaseproof Papers

Paterson Parchment Paper Co. offers a data sheet on a new series of plastic-coated parchments identified as No. 27-33T. Combining a high gloss finish, grease resistance, moisture protection, and wet strength, this paper is available in plain or printed form. It can be used as a general purpose wrapper for foods containing both moisture and fats, as a printed outer or plain inner liner for spirally-wound tubes used for packaging foods or industrial products containing oils, as a wrapper for protecting oiled metal parts against moisture, and as a carton liner for packaging moisture sensitive products. A sample of this paper

TECH DATA

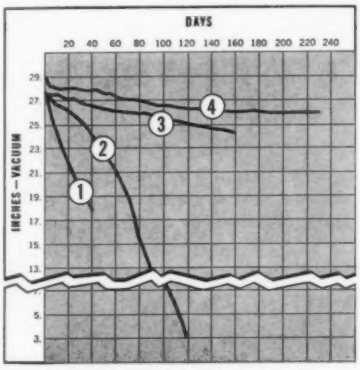
from STAN PAK T.M.

BARRIER PROPERTIES

One special problem in vacuum or controlled atmosphere packaging is the maintenance of high vacuum or low oxygen content over an extended period of shelf life. To solve this problem, Standard Packaging Corporation offers a range of materials, the choice depending upon persistence of protection required. The barrier properties of four particular films are illustrated here.

GAS PERMEABILITY OF FLEXIBLE TRANSPARENT PACKAGING MATERIALS

Pressure rise in vacuum packaged pouch with 50.3 sq. in. transmission area

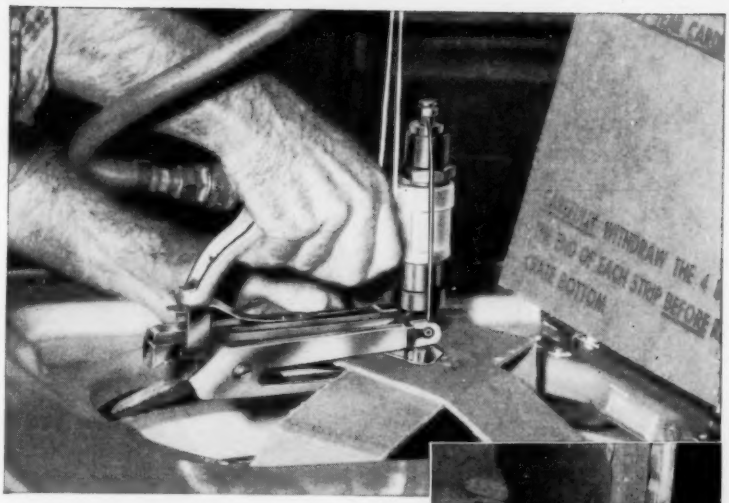


(1) FLEXAR 102 (3) FLEXAR 12
(2) ARPEX 101 (4) ATMOCEL 5

These materials—just four of the many film, foil and paper combinations developed by Standard—are recommended for packaging frozen food, cheese, luncheon meat and other products requiring low WVTR and GTR. They are available plain, or printed by flexography or gravure.

For additional data on the laboratory tests and samples of the films, write to our Technical Director.

STANDARD PACKAGING
CORPORATION
FLEXIBLE PACKAGING DIVISION
1 LISBON STREET, CLIFTON, N. J.



1 **Staple corrugated "bridging"** easier with portable DUO-FAST Air Pliers. Handy, trigger-fired tool saves time . . . you take the tool to the work, instead of moving the work to the tool.

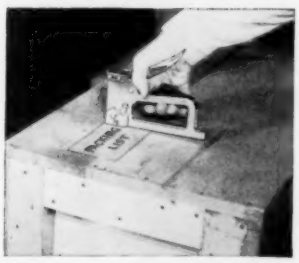
2 **Line boxcars faster** with a handy DUO-FAST Hammer Tacker. Speedy one-hand tool drives staples as fast as you swing it. Shippers and railroads agree . . . it's the best and easiest method.

3 more ways to save on packing with DUO-FAST automatic stapling

Shown here are 3 of the ways DUO-FAST Automatic Stapling can reduce shipping costs for you. There are many more.

Check your DUO-FAST man today. With over 150 Staple-tacking models to offer, he can show you the safe, accurate, *automatic* way to streamline your fastening methods.

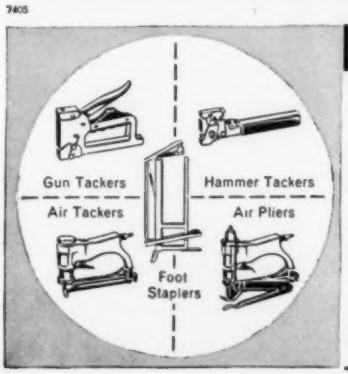
Free maintenance. And remember: DUO-FAST Staplers carry a money-saving Free Service Guarantee. Send coupon below for free "Timesavers" bulletin FT-50.



3 **Attach tags and labels** the easy way with this versatile DUO-FAST Gun Tacker. You just compress the handle . . . staple drives quickly, neatly, securely. A great all-purpose tool.

DUO-FAST
Staplers • Tackers • Staples

7405



New Ideas for you!

FASTENER CORPORATION
3756-64 River Road, Franklin Park, Ill.
Without cost or obligation, please:

☐ send DUO-FAST Bulletin FT-50, "Timesavers for Shipping Departments."
☐ have a DUO-FAST man call on us.

Name_____
Firm_____
Address_____
City_____ Zone___ State_____

TWO WELL-KNOWN BARRIERS COMBINED
MOISTUREPROOF
GREASEPROOF
VAPORPROOF
CRACKPROOF
PRINTABLE
DURABLE
The Coating: POLYETHYLENE
The Base: CELLOPHANE
TO PRODUCE A GREAT BARRIER
HPS POLYCEL® Polyethylene Coated Cellophane
TRANSPARENT PACKAGING
*POLYCEL YOUR PRODUCT! Sell in POLYCEL for best visibility, pliability and protection. Keep it wet, keep it dry, keep it clean in heat-sealable POLYCEL. Combines the best protective properties of both Polyethylene and Cellophane.
HPS POLYETHYLENE COATINGS! The result of research and experience in applying them to Glassines, Foils, Pouch Stocks and Other Materials is evident when you see and hear the complete Polyethylene coating story. Write for details.
* POLYCEL is a Registered Trademark
Ask your converter or write:
HPS
H·P·SMITH
5011 W. Sixty-Sixth Street
CHICAGO 38

is included. Circle No. **123.**

Acetate Fibre Tapes

Minnesota Mining & Mfg. Co. has published a six-page illustrated bulletin describing its "Scotch" brand acetate fibre tapes. These are tapes with a cellulose acetate film backing which is reinforced with rope paper tissue. They are resistant to moisture, have high adhesion, are long-aging, and are available in twelve colors or transparent. A table is included wich lists the thickness, tensile strength, stretch, and adhesion ratings for eight different types of this pressure sensitive tape. Circle No. **124.**

Case Packers

Chisholm-Ryder Co. of Pennsylvania has published Bulletin No. 1657, which explains the advantages of its casers. Four models are described. These machines handle the full range of can sizes from 202 to 610 diameter and up to 910 high. These units feature either right or left-handed discharge and where higher capacities are required, duplicate discharge parts may be added, permitting both right and left-hand discharge and calling for two operators. Circle No. **125.**

Pillow-Style Packaging Machine

Lynch Corp. describes a new automatic packaging machine, the Model 100, in a current information sheet. This is a single-tube unit that forms, fills, and seals pillow-style packages at speeds up to 60/min. It handles solids, liquids, powders, and granules, packaging them in a wide variety of heat-sealable materials. This machine can produce a flat or foldover seam seal in a package size range of 6″ maximum width and from 4″ to 12″ length. Circle No. **126.**

Industrial Parts Packaging

Pak-Rapid, Inc., offers a data sheet on a pouch-making, loading, and sealing machine for small parts. It automatically packages even or odd shaped items in single or multiple units, whether oily or dry, up to 1-1/4″ thick, in transparent films, barrier papers, or foil laminations. This unit meets all requirements of MIL-P-116-B Method 1 packages, and MIL-STD-129 identification requirements, even to evacuating all trapped air required under Method 1A8. Circle No. **127.**

Wrapping Machines

Oliver Machinery Co. Bulletin No. 550815 describes Oliver automatic wrapping machines. These units wrap a wide variety of articles of rectangular or irregular shapes such as cakes, cookies, candy bars, frozen foods, dried fruits, textiles, etc. They can overwrap cartons, trays, U-boards, and flat cards, or these products may be wrapped without any support. These machines handle waxed paper, glassine, cellophane, or almost any other heat-sealable material. This folder also describes a label imprinter and a package-top labeler that handles thermoplastic labels. Circle No. **128.**

Tablet Counter

The Lakso Co., Inc., has a brochure available that describes its Model 55 rotary tablet counter. It fills bottles up through 100's at a rate as high as 300/min. This machine works well in conjunction with

For more information circle No. 258 on Reader Service Card

ANNOUNCING

The New Doughboy

AUTOMATIC JAW SEALER-LABELER

DOUBLE SPEED

As the Doughboy Automatic Jaw Sealer-Labeler takes over one-half the work formerly handled by the operator, production is increased by approximately 50% .

When the bag is placed in position, the pneumatic arm control holds it, delivers the label to the bag, centers the label, applies the label, seals the bag, and discharges the labeled sealed bag, all automatically. Operator does not have to attend the package through the labeling-sealing cycle, but prepares next bag for the machine. She works no harder but packages are labeled and sealed at twice the speed.

DOUBLE SAVING

With the Doughboy Automatic Jaw Sealer-Labeler turning out sealed and labeled packages approximately 50% faster, the direct labor cost per package is cut in half.

With positive one-at-a-time label delivery, exact automatic centering, throw-outs due to off-center labeling, doubled labels and machine jams are practically eliminated.

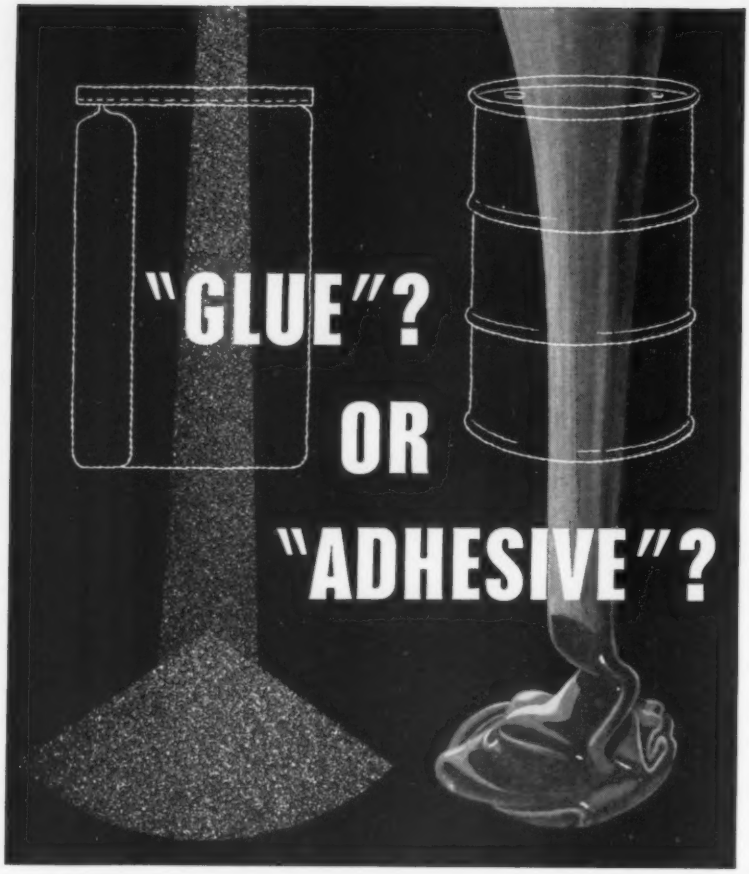
Precision engineered and ruggedly built for the continuous operation, the Doughboy Jaw Sealer-Labeler will function in production line sealing and labeling of cellophane, cello-laminates, polyethylene and saran bags.

Do Better with Doughboy

DOUGHBOY INDUSTRIES, INC.
NEW RICHMOND

Doughboy

MECHANICAL DIVISION
WISCONSIN, U. S. A.



No matter what you call it—

—when you order a prepared ADHESIVE from your regular supplier, be sure to specify a product based on *performance-proved animal glue*—or

—if you use dry, granulated animal GLUE in formulating your own adhesive mixtures, take advantage of the quality and economy of DARLING's Improved Bone Glues.

One of these 7 should do your job most economically

GREEN STRIPE	196-220 grams
ORANGE STRIPE	171-195 grams
ORANGE STRIPE	146-170 grams
RED STRIPE	121-145 grams
RED STRIPE	101-120 grams
RED STRIPE	81-100 grams
BLACK STRIPE	30-80 grams

Shipped in 100 lb. multiwall bags. For prices and technical information see your Darling representative or write

DARLING'S Improved BONE GLUE

DARLING & COMPANY
GLUE DIVISION
4201 South Ashland Avenue, Chicago 9, Illinois
Animal By-Products is Our Main Business

high-speed bottle feeders, cottoners, labelers, etc. It has two automatic check points to insure accuracy. Circle No. **129.**

Tubular Packaging

Niemand Bros. has issued an illustrated brochure describing its complete line of tubular paper packaging products. This brochure details its custom built and industrial packaging products, dispenser packages, goose-neck packaging, and similar units. Niemand says its products can be designed and produced to a wide variety of specifications and requirements. Circle No. **130.**

Versatile Wrapper

National Equipment Corp. describes its "Speed-Wrap," a portable wrapping machine in a current information sheet. Offering a choice of folds, it handles cellophane, Pliofilm, foil, and heat-sealable papers. Speeds range between 800 and 1,200/hr., handling tray-type packages in sizes up to 15" long, 9-1/2" wide, and 5" high. Circle No. **131.**

Polyethylene Heat Sealer

Mercury Heat Sealing Equipment Co. offers an information sheet that describes a foot-operated heat sealer that is especially designed for polyethylene. Available with sealing bars from 12" to 16" wide, this machine is mounted on a portable stand and can be operated from a standing or sitting position. Unit will also seal Pliofilm, vinyls, Saran, Mylar, Kel-F and nylon. Circle No. **132.**

Creped Greaseproof Wrapping

Ludlow Papers, Inc., manufactures a new grade of polyethylene-coated creped wrapping paper which is described in a current information sheet. Called Poly Induwrap, it is a Grade A paper qualified under MIL-B-121A for wrapping slushed metal parts. The polyethylene coating retains its properties in high and low temperatures, and the sheet is secondary creped for easier packaging and for tight conforming wrapping of irregular shapes. Circle No. **133.**

Corrugated Boxes

Hoerner Boxes has a brochure on two new services it is offering to users of corrugated boxes—a product development and engineering laboratory and the services of the National Safe Transit Program. NSTP testing procedures are described and benefits explained. Circle No. **134.**

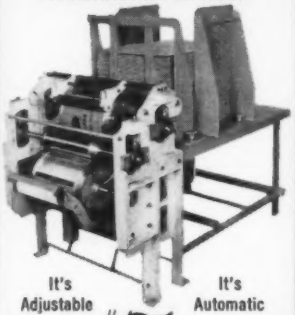
Conveyor/Carton Sealer

Better Packages, Inc., offers literature on its conveyor Boxize #5. Cartons to be sealed enter the Boxize one at a time from a storage conveyor. Each box measures its own tape length, which is automatically dispensed over the center of the box for quick and easy application by the packer. Release of the sealed carton automatically permits the next carton to enter the sealing unit from the storage conveyor. The tape dispensing unit is adjusted to permit passage of the tallest carton in the assortment being sealed, and can accommodate cartons up to 26" in height. The standard Boxize unit handles cartons up to 30" long and 23" wide. Circle No. **135.**

Urethane Foam

Mobay Chemical Co. has a 20-page

INPLANT PRINTS UP TO 3000 IMPRESSIONS PER HOUR



It's Adjustable — It's Automatic

INDUSTRIAL'S #7® AUTOPRINTER!

For production line marking, dating and coding of multiwall bags, cartons and bulk containers.

When dependable output must be coupled with flexibility and rapid changeover, it's a perfect job for Industrial's Autoprinter.

Completely automatic and electronically controlled, the Autoprinter works right with your production line . . . at speeds up to 3,000 neat, legible impressions per hour regardless of surface variation! Saves inventory, pre-printing, storage costs. Uses interchangeable rubber type, requires minimum of attention. The Autoprinter has been engineered and built for effective performance . . . and with proper care, will give you a lifetime of service.

other INDUSTRIAL units include:

The WHIPPET Marker®

The WHIPPET Marker — for automatic low cost conveyor line marking.

The RAINBOW Trans-leaf Coder®

— for automatically marking any material that takes hot dye transfer impressions.

SPECIALS—Our Specialty. We make and supply all types of special marking equipment, custom designed and built for your individual needs.

Write for complete details and new catalog today! Dept. PE

ime INDUSTRIAL MARKING EQUIPMENT company, inc.
655 BERRIMAN ST. | BROOKLYN 8, N.Y. | NI 9-3305

booklet reviewing the details of its urethane foams. Not only are their properties and performance features illustrated and described, but also a range of applications is included. Circle No. **136.**

Package Testing Equipment

Gaynes Engineering Co. offers a catalog containing data sheets on all models of its package testing equipment. Included is data on its vibration testers, incline-impact (conbur) testers, drum testers, and drop testers. Circle No. **137.**

Packaging Machinery

Peters Machinery Co. has an eight-page catalog of its packaging machinery, including equipment for carton forming and lining, carton folding and closing, and carton and tray forming and gluing. Carton sizes, machine specifications, and installation floor plans are included. These machines range from 30 to 175 or more units/min. Circle No. **138.**

Versatile Wrapper

Miller Wrapping & Sealing Machine Co. describes its Model MPS wrapping machine in an information sheet. It wraps boxes or open trays of foods, textiles, drugs, stationery, etc., using roll or sheet-fed wrapping materials. It heat seals or glue seals with cold glue. Speeds range up to 21 pkgs/min. Circle No. **139.**

Straight Line Filler

The Filler Machine Co., Inc., offers an illustrated data sheet on the Model SL-55 straight line filler. This is designed to handle semi-liquid and semi-solid products such as jellies, mayonnaise, salad dressing, cosmetics, pharmaceuticals, petroleum, and chemical products. Five types of this model are available offering speed ranges up to 300/min. Circle No. **140.**

Glass Container Labeler

Economic Machinery Co. gives specifications and descriptions for two models of the World turret labelers in Bulletin TU-267. These machines can apply body labels, body and shoulder labels, or body and wrap-around neck labels on any type of round, oval, paneled, or fluted glass containers, including bottles, tumblers, jars, and flasks. Featuring quick changeover and a no bottle—no label control, these units offer a speed range from 70 to 160 bottles/min. Container range is from 1″ to 4″ dia., 2-1/2″ to 13″ high, 1″ to 5-1/2″ wide. Circle No. **141.**

Heavy-Duty Corrugated Packages

Gaylord Container Corp., Div. Crown Zellerbach Corp., has released an illustrated brochure on case histories of six packaging problems solved with Drumpak, a heavy-duty corrugated container. Data are given on savings realized by manufacturers of chemicals, appliances, and various other industrial products. Circle No. **142.**

Semi-Automatic/Automatic Fillers

J. L. Ferguson Co. has a four-page bulletin on its automatic and semi-automatic filling machines for semi- and non-free-flowing products. The fully automatic telescoping volumetric filler fills cans or cartons at

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beyond measure
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TUBULAR PAPER PACKAGES

There's a difference between NB packages and others you can buy. Sometimes you can't see this difference — or even measure it. But when you put NB packages to work, their finer qualities become something you can measure in dollars and cents of extra sales. Fine base materials, craftsmanship treatment of these materials, and only top-quality standards of manufacture are the basis of this extra performance. And, beyond this, is an unmatched experience in fine package making.

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NB

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Manufacturers of Paper Tube Products
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POST DECITRON ELECTRONIC PRODUCTS

Now . . . low cost . . . accurate "batch" counting for small products.

The *PORTABLE* FCB-1

The Post FCB-1 is a sorting and counting device which incorporates a Syntron vibrator with a Decitron Preset Counter. Model illustrated utilizes a P2 counter, capable of 'batch' counting small objects in any quantity from 1 to 100.

Very small products can be neatly separated on the special conveyor belt . . . individually counted . . . dropped into a 'hold' tray and when the desired count is reached, the entire batch is fed into a waiting box, bag or other container. This latest Post development will feed 300 to 1000 pieces per minute and is **portable!** Size: only 53" long, 18" high, 12" wide. Cost as shown, $3500.

Post will be glad to furnish quotations for models capable of counting larger batches.

Decitron

POST ELECTRONICS

Division of Post Machinery Co. | 165 Elliott St., Beverly, Mass.

For more information circle No. 263 on Reader Service Card

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Shown is only one of many Wrap-Ade Unit Packagers. Other models available for packaging:

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- **POWDERS**
- **TABLETS**
- **SOFT GOODS**
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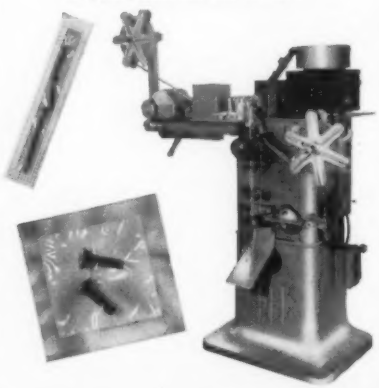
- **HARDWARE**

or any reasonably flat small product

Send us a sample of your product today for our prompt quotation.

This Wrap-Ade Unit Packager was selected by a **NAIL & SCREW MANUFACTURER** to speed production and cut costs.



wrap-ade **MACHINE CO., INC.**

Celebrating a Quarter Century of Progress in Packaging

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PHONE—PLYMOUTH 9-6150

speeds up to 300/min. Auger packer and auger packer-weigher will fill bags, round or rectangular cans or cartons in a wide variety of sizes. Engineering drawings illustrate all machines. Circle No. **143.**

Box/Tray Former & Sealer

FMC Packaging Machinery Div. of Food Machinery & Chemical Corp. has literature on its Kingsbury & Davis thermoplastic quad stayer which forms and heat seals "Poly Pak" tuck lid boxes and trays. This unit will make a wide variety of sizes and shapes of polyethylene-coated containers, which do not require either an adhesive or stay tape, at production rates of up to 3,000/hr. Circle No. **144.**

Putty Filling Machine

Hope Machine Co. offers Bulletin 41P, which is a case history describing the step-by-step action of its piston filler handling putty. This is a heavy-duty three-line machine that produces filling speeds of 40 1-lb. cans/min. or 10 5-lb. cans/min. Circle No. **145.**

Paper Products Wrapping

Hayssen Mfg. Co. has prepared a four-page folder on its wrapping machines for paper products. Equipment is illustrated and described that will wrap roll toilet tissue (2-, 3-, 4-roll packages), napkins, and paper by the ream. Also illustrated is an automatic end labeler that can be fitted to ream wrapper or used separately. Machines will handle paper, cellophane, polyethylene, Vitafilm, and similar materials. Circle No. **146.**

Hand Boxer

International Staple and Machine Co. has a hand boxer for stapling filled cartons from the outside. Brochure No. 100 describes this device, which will staple top and bottom of a container in 20 secs. Circle No. **147.**

Packaging group pays off: New operation succeeds

(*Continued from Page 28*)

how to do the new packaging operation. The instructions include diagrams and sketches where necessary.

Crane has a challenge for the box manufacturers: It would like to have a locking top, multiple-depth corrugated box, but as yet no manufacturer has come forth with one. Therefore, top flaps are secured with gummed tape. The problem is that as yet a multi-scored box cannot be locked in the same way as the box bottom can be. Crane engineers assure a warm welcome to the manufacturer who has such a box. (*End*)

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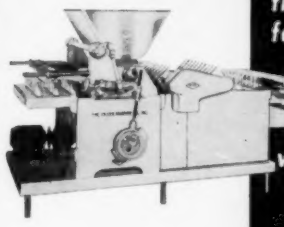

GEYER ten line piston filler with separate motor driven agitator, rollover, cleaner and automatic feeding device

fill your products faster at LOWER operating cost

with the GEYER **TEN LINE FILLER**

You can fill your semi-liquid and semi-solid products faster and more economically with the GEYER ten line filler. This sturdy unit offers operating economies no other filler can offer plus:

- filling speeds up to 200 containers per minute
- versatility of products handled including food, dairy, paint and chemical products
- simplicity of operation
- versatility of containers handled —from 2 oz. to gallon containers
- easy cleaning, fast change-over
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- sanitary construction around the filling zone

Write, wire or call for more details on the GEYER ten line filler or our other fillers to meet the needs of the small and large packer.

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12 PENN AVE., ROCKLEDGE, PHILA. 11, PA., PIlgrim 5-0170
the original builder of Philadelphia piston fillers

Circle No. 265 on Card

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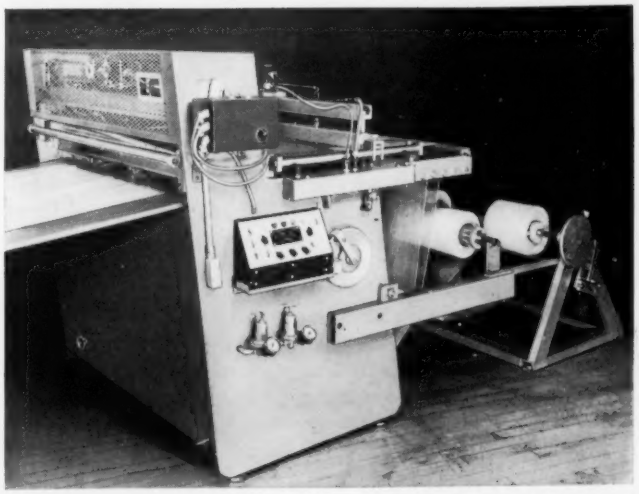
- **Up to 300 Bags p.m.**
- **Widths to 45"**
- **Lengths to 70"** *(and longer)*

Dependable high speed operation by leading converters has proved the new "Airtronic" a distinct advancement in polyethylene bag making. Sizes up to 45" wide; up to 70" long (longer on special order). Up to 100 bags per minute (one up). With Multiple Roll Unwind Stand, up to 300 bags per minute. Variable speed drive. Handles seamless tubing up to 10 mil flat or up to 3 mil gusseted. Hole punching mechanism and electric eye optional.

MODERN ELECTRONIC CONTROLS and AIR OPERATION replace complex mechanical parts, reduce wear, cut maintenance, simplify operation and insure better bags faster, at lower cost.



PRECISION CONTROLLED heat, pressure and dwell time on *relaxed* film insure consistently tight bag seals. Sealing dwell is instantly adjustable—no loss of time for temperature change. *It will pay you to know in how many ways the NEW Corley-Miller Airtronic machine can modernize your bag making production; so send for complete details without delay.*

MILLER WRAPPING & SEALING MACHINE CO.
14 So. Clinton St., Chicago 6, Ill., Phone RA 6-1883
More than a Half Century of Packaging Machinery Engineering

What we think

Do we make the most of our box tests?

Even though more and more companies now show greater interest in corrugated box testing, the fact remains that too few companies make and use these tests to their full worth. We are glad to see an increasing number of companies use their box tests as a tool for tailoring performance requirements. At the same time, it is quite evident that some companies do not know enough about tests and others fail to appreciate their true value.

Wanted: New tests, new understanding of tests

We need new tests to fill the gaps in our somewhat skeletal test structure and we need to do a better job of interpreting and applying the tests we have. For example, some tests evaluate just the materials. Today this is not the major problem. Materials and components have improved steadily over the years.

What we need now is better testing of fabrication rather than materials. Some of our newer tests show much promise in this direction. In spite of certain obvious limitations, the short column crush test, for instance, has a lot more to offer than many companies realize. With it you get a crush value of the whole built-up structure. This reflects not only the weight and quality of materials used, but also it reflects the manufacturing or fabricating quality. Experts familiar with this test tell us it can be correlated with the actual performance of a container.

Another test we might look at more closely is the ring crush test. It, too, is a good barometer of box performance and experts can make predictions with it. Likewise there might be more attention to tension tests. Often box failure is due to tensional stress.

Perhaps we have been expecting too much of some of our traditional tests, for example, the Mullen. We think this test is fine for paper, note that it is easy to use, and see that is has a definite and continuing place in package testing. However, we warn against expecting very much from it in the way of predicting the performance of *built-up structures* or *fabricated* corrugated boxes.

Be careful in using and interpreting tests

Anyone threading his way through the maze of box testing must be wary at every step. Sometimes there is a tendency to apply the wrong tests. At other times the interpretation may be way off. Perhaps the real difficulty lies in relating tests to the particular requirements being tested. And any test must be oriented into the over-all structure and must stand examination in the light of realistic test limitations.

In spite of these warning signals and in spite of the lack of information or interest about box testing in many quarters, the general trend remains clear: We are going to see more and more accurate tailoring (through tests) of box materials and capabilities to meet highly specific performance properties. Some of our large box users are making strides in this direction and are coming to insist on box fabrication being in accord with these performance requirements.

All this is clearly in line with one of the major general trends of our packaging world of today: Reducing our decisions to a quantitative basis and taking the guesswork out of alternative packaging choices.

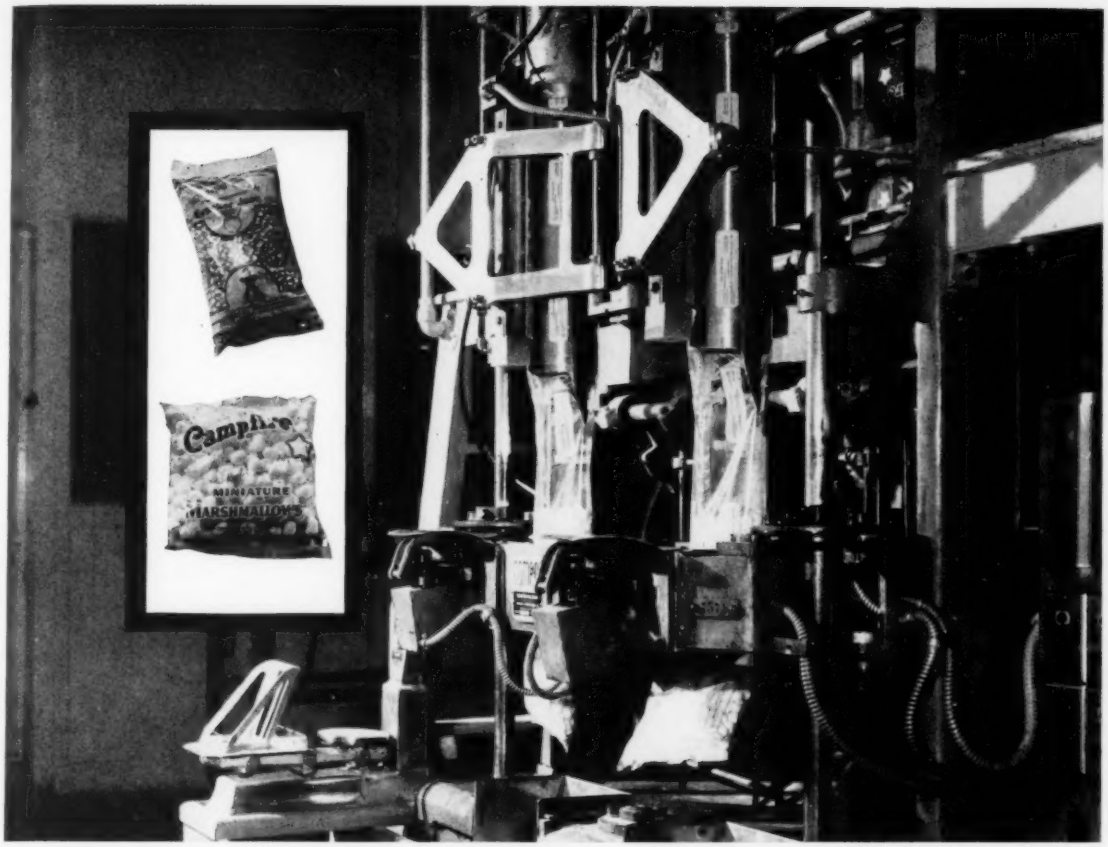
Tests point way to cost reduction

In spite of whatever limitations crop up in connection with these newer or less well known tests, the bright spot in the picture is that the tests *are* developing. Users are becoming increasingly conscious of the importance of testing. Further, users and suppliers are taking special interest in tests of immediate concern to their respective areas. We see suppliers focusing attention on tests of materials, while our users look to tests of the performance of the finished boxes.

Thus we are becoming aware of the gaps and are seeking to fill them. As we develop a better way of measuring the performance of our finished boxes (and refine our test structure in the course of all this) users and suppliers alike will become acutely aware of new vistas of technical progress and untapped potentials for cost reductions—attainable through a structural and functional tailoring of performance requirements.

Bruce Holmgren

Editor



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TRADE MARK

Saves us money. Gives us higher quality bags."

"Our switch to VISQUEEN 'Q' film gave us a low initial cost. We have far less breakage, too. Put together, these two savings have cut our packaging cost considerably.

"The superior clarity of VISQUEEN 'Q' film completely discloses the eye-catching, sales-generating qualities of Campfire marshmallows and Cracker Jack popping corn.

"Vivid color printing—the best we've ever had—with no smudging or blurring, was another advantage we got with VISQUEEN film.

"We make 40 bags per minute on each of our Haysen Compak machines, which seam the VISQUEEN film sheet and heat-seal the filled bags. Milprint, Inc., Milwaukee; Color Wrap Company, Cicero, Illinois; and CelluCraft, New Hyde Park, New York, supply VISQUEEN film to Cracker Jack Co."

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U.S.I. POLYETHYLENE NEWS

A series for plastics and packaging executives by the makers of PETROTHENE® polyethylene

Packaging Notes

New Shock-proof Package has been developed for dropping medical supplies by air without the use of parachutes. The package features a flexible tube of polyethylene twist-suspended inside a fiber case by means of rings attached to the case. In addition to drop tests, the package has been subjected to water-spray and other tests.

Although developed primarily as a drop case for military and disaster use, the package has attracted the attention of electronic tube manufacturers and instrument makers as a replacement for the more costly and less safe packaging now in use.

Polyethylene and Steel Returnable Container for the shipment of corrosive chemicals is now being marketed. The container features a polyethylene inner container with a steel drum outer jacket. Compared with conventional glass carboys, the new container is claimed to have a lower package cost, lower tare weight, and less cubage . . . with consequent savings in freight and handling costs. Container is being made in two sizes: standard weight 14 gallon with 5¾ pound inner container, and the heavy-duty 13 gallon with 8¾ pound inner container.

Polyethylene Zippers are being used on filter cloth bags. The zippers are jam-proof and corrosion-resistant. The poly zipper strip is sewn to the cloth with a special stitch that prevents leaking. Zippers ride in smooth grooves with no teeth to snag or collect dirt. Closure is said to withstand 80-pound pull.

Self-venting Poly Closures for Drums eliminate the need for separate vents on containers used to ship liquids. The venting feature is an improvement on the retractable polyethylene spout familiar to users of liquid chemicals in metal drums.

The improved spout prevents liquid surge or "glug" in pouring. It is claimed that there is no waste or spillage, since the closure will vent in any pouring position. The polyethylene cap for the new spout also features a small bail to facilitate pulling the spout up into pouring position.

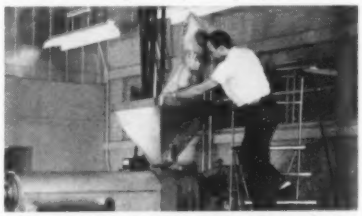
Self-venting flexible spout pours easily from any position. Picture shows spout being raised into pouring position via new bail on reseal cap.

New Petrothene® Shut-down Resin Solves Problem of Post-startup Rejects

Eliminates High Temperature Degradation of Resin Left in Machine

A special shut-down resin is being made available as a service to customers by U.S.I. Intended for use immediately before shut-down, this material is designed to prevent the high temperature degradation that is usually encountered in polyethylene processing equipment during normal shut-down and start-up procedures.

When a machine operating on conventional resin shuts down, the product immediately after start-up is usually unsatisfactory. Gels, fisheyes, discolored particles, and other evidences of resin deterioration show up, not only in the initial production, but sometimes for hours afterward. The reason: Resin in some parts of the machine is held too long at too high a temperature. Thermal degradation results.



Adding Petrothene 205-1 to purge the production resin from the machine just prior to shut-down eliminates usual waste at start-up.

U.S.I.'s answer to the problem is PETROTHENE 205-1, a specially prepared resin that will withstand prolonged exposure to high temperature. When this material is in the machine during normal cooling and heating periods before and after shut-down, minimum thermal degradation takes place.

The technique for using the resin is simple. A few minutes before shut-down the special resin is fed to the machine. When the normal resin has been purged, the machine can be shut down. There is little or no waste and no after effect in the machine when the new resin is used.

PETROTHENE 205-1 is supplied in pellet form, packed in 50-lb. bags. Full details about this special shut-down resin may be obtained by contacting your nearest U.S.I. office.

New Resin for Poly Pipe Wins NSF Approval Seal

A new U.S.I. polyethylene resin — "Petrothene" 102-216 — has been given the National Sanitation Foundation Seal of Approval for use in potable water supply pipe. Pipe made with the new resin has given outstanding results in tests conducted at U.S.I.'s Research and Development Laboratory. Minimum quick burst pressure was 15 to 20% above the minimum required under the Dept. of Commerce specification CS197-57.

Borated Polyethylene: Order 6-8 Weeks in Advance of Use

Users of borated polyethylene are advised to schedule their orders six to eight weeks in advance of their projected use dates. The compounded resin picks up moisture from the air and must therefore be used within a short time after preparation. The six to eight week lead time on orders enables U.S.I. to schedule production for this specialized grade and insures delivery as close as possible to actual use date.

Polyethylene plus Glass Fiber Yields New Basic Film Material

Polyethylene is now being reinforced with glass fiber to produce a new film that combines the advantages of both these materials. The film, reinforced with non-woven glass fabric, is at present being made in a range of gauges and in clear and black.

Glass fiber reinforcement gives dimensional stability to the film, so that it does not stretch or billow. It also increases the film's break, burst, and tear strengths, which gives the film longer life in rugged applications and makes possible the use of thinner films. Four-mil reinforced film, for example, is said to more than do the job of 6-mil unreinforced film.

Other advantages cited include easier repair because any tears or rips are localized, easier heat sealing because films are thinner, higher grommet strength, and low cost.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
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